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THE

AMERICAN BUILDER'S

GENERAL

PRICE BOOK AND ESTIMATOR,

TO ELUCIDATE THE PRINCIPLES OF ASCERTAINING THE CORRECT VALUE

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ARTIFICERS' WORK

REQUIRED IN BUILDING,

FROM THE PRIME COST OF MATERIALS AND LABOR,

IN

ANY PART OF NEW ENGLAND:

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IN THE

ART OF BUILDING.

TO WHICH ARE ADDED

A VARIETY OF USEFUL TABLES, MEMORANDA, &c.

BY JAMES GALLIER, Architect.

SECOND EDITION, REVISED AND IMPROVED.

BOSTON:

M. BURNS, 134 WASHINGTON STREET.

SOLD ALSO BY

JAMES MUNROE & CO., OTIS, BROADERS & CO. AND B. B. MUSSEY.

1836.

TH
434
.G17
1836

ADVERTISEMENT.

THIS work has been examined and approved by ALEXANDER PARRIS, Esq. United States Architect; ISAIAH ROGERS, Esq. Architect of the Tremont House, Boston, Suffolk Bank, Boston, and Astor House, New York; JAMES MCALLISTER, Esq. Superintendent of the New Court House, Boston, and GRIDLEY BRYANT, Esq. Agent of the Frankfort Granite Company.

Entered according to Act of Congress, in the year 1836,

BY M. BURNS,

In the Clerk's Office of the District Court of Massachusetts.

JUN 27 1942

HINCKLEY COLLECTION

Div
Mineral Bur
6-15-50
71260

ESTIMATE OF COST OF SUFFOLK BANK, BOSTON.

[SEE FRONTISPIECE.]

MR BURNS,

SIR—Agreeably to your request I hereby give you the amount of the Survey Bill of the Carpenter's Work, at the Boston Rules, of the Suffolk Bank, built in State street, in this city, together with the number of yards of Plastering, feet of Cornice, &c. of the said Bank, with the number of yards of Painting for do. done in the year 1834.

Carpenter's Work, at the Rules,	$8154 75
Plastering, 2383½ yards, at 25 cts. per yard,	
Discount 40 per ct. agreeable to Rules of work.	
———, 1247 feet cornice and mitres, at 17 cts. per foot,	
Painting outside and inside, 16 cts. per yard,	
Glazing, 6 cents per light,	
4327 yards of one, two, three and four coats paint,	
511 yards graining and 562 yards varnishing,	
For net cost of the Granite furnished by the Railway Company,	10,500 00

The entire cost of the Suffolk Bank is estimated at about $40.000.

LOTT POOL, *Surveyor of Works.*

Boston, April 6, 1836.

PRICES OF GRANITE IN THE ROUGH AT THE QUARRIES.

Quincy Granite, per cubic foot, 45 to 55 cents.

The above price is intended for all stone which do not contain more than 25 cubic feet; if larger, the price to increase in the ratio of 1 cent for every additional foot, i. e. a stone containing 25 cubic feet, at 55 cents per foot, 26 do. at 56 cents per foot, 27 do. at 57 cents per foot, and so on.

Ashler, per foot, from 33 to 38 cents, for all stone not exceeding 1 foot 8 inches in width; if wider, the price to increase 1 cent for every two inches additional width.

Platforms, 2 feet 8 inches wide, from 40 to 50 cents; the price to increase 12 cents for every 6 inches additional width.

Cellar Stone, from $1.25 to 2.50 per perch.

Stone for Quay Walls, 50 cents per perch.

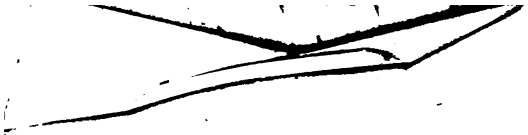
Sandy Bay Granite, at the quarries.—Stones, for hammering, 20 per cent less than the Quincy stone.

Eastern Granite at the quarries, 15 per cent lower than the Quincy Granite.

PRICES OF LUMBER IN BOSTON, MAY, 1836.

No. 2 Boards,	38
" 3 do.	27
" 4 do.	16
Dimension Pine, good,	38
Spruce do. of all kinds,	13 to 15
Timber, per ton, 40 st.	8
Shingles, best pine, reft.	5
Do. clear, sawed,	4½
Do. No. 1, do.	4
Do. Cedar, from	2½ to 3½
1½ Laths, from 10s. 6d. to 12s.	
1½ do. from 7s. 6. to 9s.	

HIRAM BOSWORTH,
Lumber Dealer and Carpenter.



PREFACE.

WHEN the number of persons concerned, the unceasing industry displayed, and the immense capital employed in the erection of buildings, throughout this great and enterprising Republic, are taken into consideration, the means of ascertaining the correct value of every operation relative thereto, must have long been a desideratum to every one interested in the profession. A Guide for this purpose is much more indispensable at the present period than formerly, when town-houses were constructed of nearly the same shape and size, so that the cost of one would serve as a general standard for all.

Within the last few years, a very important change in public taste, with regard to Architecture, has taken place in this country. Our wealthy Merchants and Citizens have now exploded the erroneous idea entertained by their predecessors, that it would be folly to erect their buildings on principles calculated to insure their durability for upwards of a century, from the chance of their becoming unfashionable with the succeeding generation. They are now convinced, that by the employment of persons properly qualified to design, and superintend the erection of their edifices, on principles deduced from the pure classic authorities of antiquity, they may have buildings produced at the same, or perhaps less cost than formerly, which can never become unfashionable, so long as correct taste and a love of the arts are duly appreciated. This improved style will occasion a corresponding difference in the arrangement and in the manner of execution; and, as a necessary consequence, no two houses will be exactly alike in every particular: hence the absolute necessity that every Builder should be furnished with the requisite means of obtaining the exact value of every thing relating to his Art, under every variety of form and of application.

These are the views which have led to the present undertaking; in how far it may be found to answer the purpose intended, must remain for the Profession and the Public to decide.

In the arrangement of the work, I have endeavored to render every thing as clear and comprehensive as the nature of the subject would admit. I wish not to arrogate to myself any particular merit from the manner of treating the various subjects herein contained, as many of them have been before investigated by persons of much greater ability, of whose labors I have freely availed myself.

I hold it to be a duty incumbent on every one connected with the Art, to attempt an addition to the general stock of knowledge; and be that addition ever so little, it will tend to advance the profession, and ultimately prove beneficial to the public.

I am aware of the great responsibility incurred by such an undertaking, and if the work should be found to contain imperfections, inseparable from a first edition, the Profession and the Public are respectfully solicited to forward any communications or amendments, that to them may appear necessary, to my office, at CLINTON HALL, New-York, which will be thankfully received, and gratuitously inserted in future editions.

JAMES GALLIER.

New-York, January 19th, 1833.

MENSURATION.

MENSURATION OF SUPERFICES.

To find the Area of a four sided Figure, whether it be a square, a parallelogram, a rhombus, or a rhomboid.

RULE.—Multiply the length by the breadth, or height, and the product will be the area.

To find the Area of a right angled Triangle.

RULE.—Multiply the base by half the perpendicular, and the product will be the area.

To find the Area of an acute angled Triangle.

RULE.—Multiply the length of the longest side by half the perpendicular let fall upon it from the opposite angle, and the product will be the area.

Having the base and perpendicular of a right angled Triangle, to find the Hypothenuse.

RULE.—Add together the squares of the base and perpendicular, and the square root of the sum will be the hypothenuse.

EXAMPLE.—If the span of a roof be 24 feet, and the height 5 feet, what would be the length of the rafters? This is resolved into two equal and similar triangles, the base of each being half the span or 12 feet; and the perpendicular equal to the height or 5 feet.

```
 5          12
 5          12
---        ---
25         144  Square of base.
             25  Square of perpendicular.
            ---
           1.69(13 feet the length of the rafter.
              1
            ---
 23)        69
            69
```

When the Hypothenuse and one Leg are given, to find the other Leg.

RULE.—Subtract the square of the leg from the square of the hypothenuse, and the square root of the remainder will give the other leg.

EXAMPLE.—In a roof whose rafters are 26 feet long, and the height 10 feet, what is the span?

```
  10                    26
  10                    26
 ---                   ---
 100 Square of height.  156 Square of rafters.
                        52
                       ---
                       676
                       100
                       ---
                       5.76(24 feet half the span.
                       4
                       ---
                    44)176
                       176
```

EXAMPLE 2.—Wanted to prop a building with raking shores, at the height of 25 feet from the ground, the shores being 30 feet long; how far from the base of the building must they be placed?

```
  30                    25
  30                    25
 ---                   ---
 900 Square of shores.  125
 625                    50
 ---                   ---
 2.75(16.58, or 16 ft. 5⅞ in.  625 Square of height.
 1      from the building.
 ---
26)175
  156
 ---
325) 1900
     1625
 ----
3308) 27500
      26464
```

To find the Length of a Cylindrical Helix.

RULE.—Multiply the circumference of the base, by the number of revolutions; to the square of the product, add the square of the height of the spiral, and the square root of the sum will be the height of the spiral; for the helix, if unwound off the cylinder and stretched out, would be a right angled triangle, the length of whose base is the number of revolutions, and the height that of the spiral.

The Chord and Versed Sine of the Arc of a Circle being given; to find the diameter.

RULE 1.—Divide the sum of the squares of the sine and versed sine, by the versed sine itself; and the quotient is the diameter.

RULE 2.—Divide the square of half the chord by the versed sine, and the quotient is the diameter wanting the versed sine; to which, add the versed sine, and the product is the diameter.

EXAMPLE.—Required the length of a rod or wire that will from a centre strike a segmental arch, whose chord or span is 28 feet, and the rise 4 feet.

```
 14 half the chord.
 14
----
 56
 14
----
4)196
----
 49
  4
----
```

It will take a rod 53 feet long.

To find the Area of a Circular Ring, or Space, included between two concentric circles.

RULE.—Find the areas of the two circles separately; then the difference between them will be the area of the ring.

To find the Circumference of an Ellipse.

RULE.—Square the two axes or diameters, and multiply the square root of half that sum by 3,1416; the product will be the circumference nearly.

To find the Area of an Ellipse.

RULE.—Multiply the transverse diameter by the conjugate, and the product by .7854; this last product will be the area.

To find the Area of a Trapezium.

RULE.—Draw a diagonal line from the two longest opposite angles, which will divide the figure into two triangles, which measure as before.

To find the Circumference of a Circle, when the Diameter is given; or the Diameter, when the Circumference is given.

RULE.—Multiply the diameter by 3.1416, and the product will be the circumference; or divide the circumfereace by 3.1416, and the quotient will be the diameter.

To find the Area of a Circle.

RULE 1.—Multiply the square of the diameter by .7854, or the square of the circumference by .07958; the product, in either case, will be the area.

RULE 2.—Multiply the circumference by the diameter, and divide the product by 4.

RULE 3.—As 14 is to 11, so is the square of the diameter to the area; or as 88 is to 7, so is the square of the circumference to the area.

To find the Length of any Arc of a Circle.

RULE 1.—From 8 times the chord of half the arc, subtract the chord of the whole arc; one third of the remainder will be the length of the arc nearly.

RULE 2.—As 180 is to the number of degrees in the arc, so is 3.1416 times the radius to its length; or, as 3 is to the number of degrees in the arc, so is .05236 times the radius to its length.

To find the Area of a Sector of a Circle.

RULE 1.—Multiply the length of the arc, by half the length of the radius; the product will be the area.

RULE 2.—As 360 degrees is to the number of degrees in the arc of the sector, so is the area of the circle to the area of the sector.

To find the Area of a Segment of a Circle.

RULE.—To the chord of the whole arc, add the chord of half the arc and one third of it more. Then multiply the sum by the versed sine, or height of the segment, and four tenths of the product will be the area of the segment.

To find the Area of an Elliptic Segment.

RULE.—Divide the height of the segment by the axis of which it is a part, and find in the table of circular segments, a segment having the same versed sine as this quotient. Then multiply the segment thus found, and the two axes of the ellipse continually together, and the product will give the area required.

OF SOLIDS.

To find the Soldity of a Cube or Parallelopipedon.

RULE.—Multiply the side of the cube by itself, and that product by the side or length; this last product will be the solidity.

To find the Solidity of a Cylinder.

RULE.—Multiply the area of the base, by the height of the cylinder, and the product will be the solid content.

To find the Convex Surface of a Cylinder.

RULE.—Multiply the circumference by the length of the cylinder, and the product will be the convex surface required.

To find the Convex Surface of a Right Cone or Pyramid.

RULE.—Multiply the circumference of the base by the slant height or length of the side, and half the product will be the surface.

To find the Convex Surface of a Frustum of a Right Cone or Pyramid.

RULE.—Multiply the sum of the perimeters of the two ends by the slant height or side of the frustum, and half the product will be the surface required.

To find the Solidity of a Cone or Pyramid.

RULE.—Multiply the area of the base by the height, and one third of the product will be the content.

To find the Solidity of the Frustum of a Cone.

RULE.—Divide the difference of the cubes of the diameters of the two ends, by the difference of the diameters; this quotient multiplied by .7854, and again by one third of the height, will give the solidity.

To find the Solidity of a Wedge.

RULE.—To the length of the edge of the wedge, add twice the length of the back; multiply this sum by the height of the wedge, and then by the breadth of the back; one sixth of the product will be the solid contents.

To find the Solidity of a Prismoid.

RULE.—Add into one sum the areas of the two ends, and four times the middle section parallel to them; then, this sum multiplied by one sixth of the height, will give the contents.

NOTE.—The length of the middle section is equal to half the sum of the lengths of the two ends, and its breadth is equal to half the sum of the breadths of the two ends.

To find the Convex Surface of a Sphere or Globe.

RULE.—Multiply the diameter of the sphere by its circumference; or, multiply 3.1416 by the square of the diameter; the product in either way will be the convex surface required.

NOTE.—The convex surface of any zone or segment may be found in like manner, by multiplying its height by the whole circumference of the sphere.

To find the Solidity of a Sphere or Globe.

RULE.—Multiply the square of the diameter by .7854, and this product again by the diameter, and two thirds of this last product will be the solidity; or, multiply the cube of the axis by .5236; the product will be the solidity.

To find the Solidity of a Spherical Segment.

RULE.—To three times the square of the radius of its base, add the square of its height; then multiply the sum by the height, and the product by .5236.

To find the Solidity of a Spherical Zone or Frustum.

RULE.—To the sum of the squares of the radius of each end, add one third of the square of the height of the zone; this sum multiplied by the said height, and the product by 1.5708, will give the solidity.

To find the Solidity of a Spheriod.

RULE.—Multiply the square of the revolving axis, by the fixed axis; the product, multiplied by .5236, will give the contents.

To find the Solidity of a Dome, less than a Hemisphere upon a square plan, when its axal sections parallel to the sides are circles.

RULE.—From twice the diameter of the vertical section multiplied into the square of the altitude, subtract the third part of 4 times the cube of the altitude, and the remainder is the solidity of the square segmental dome.

A concise Practical Method of finding the Number of Cubic Feet and Inches contained in Timber and other Materials.

If the length be given in feet and inches, and the section, or end, in inches, multiply the sides of the section by each other, and divide by 12. Also divide the length by 12; multiply these two dimensions by each other duodecimally, and the product will be the contents in cubic feet and inches.

EXAMPLE.—Find the number of cubic feet, in a piece of timber 28 feet long, 11 inches wide, and 3 inches thick.

in.		ft.	
11 }		12)28	the length.
3 }	the sides.		
12)33		Multiply	2.4
2.9		by	2.9
			4.8
			1.9.0
		6.5 gives 6 feet 5 inches	
		the solidity.	

EXAMPLE 2.—Find the cubic contents of 4 quarters or studs, each 12 feet 6 inches long, and 6 inches wide, by 2½ inches thick.

2½ }		12.6	the length.
6 }	the sides.	4	the number of pieces.
12)15		12)50.0	
1.3		Multiply	4.2
		by	1.3
			4.2
			1.0.6
		5.2.6 gives 5 feet, 2 inches and 6 parts	
		the solidity.	

GROUND DIGGING AND CARTING.

DIGGING FOUNDATIONS.

The value of digging out for foundations, cellars, &c. should be ascertained by the cubic yard of 27 cubic feet; the price for which will depend on the nature of the soil, and on the local wages paid to laborers. In loose, loamy, or sandy soil, where digging with the spade only is necessary, a man may throw up a cubic yard in an hour, or ten cubic yards in a day; but in clay or gravel, where picking is necessary, it will require two men; and in very strong gravel three men will be required to throw up the same quantity: therefore, to ascertain the price of a yard, suppose the wages of a laborer to be one dollar per day, the price will be as under:—

For digging only . . .	10	cents per yard cube.
For picking and throwing out .	20	ditto.
When two pickers are necessary	30	ditto.

When the depth of the trench, or cellar, exceeds 7 feet, or one throw, and stages are required in the height, add 10 cents per yard to the above rates for every additional depth of 7 feet.

Where wheeling off in barrows is necessary, three men will remove 30 cubic yards in a day to the distance of 20 yards; that is, two filling and one wheeling; but to wheel the same quantity in a day to any greater distance will require an additional wheeler to every 20 yards.

To find the price of removing any number of cubic yards to any given distance: divide the distance in yards by 20; the quotient will give the number of wheelers; to this quotient add the two fillers, and the sum will show the number of men employed; multiply the number of men by the daily wages of a man, and the product will be the price of 30 yards. Then as 30 yards is to the price of 30 yards, so is the whole number of yards to the price of the same.

When the stuff can be carted away, as is always the case about New York, the price should be proportioned to the distance. A man with a horse and cart, can, with the assistance of a man to fill, remove 12 loads per day to the distance of a mile, or 7 loads to the distance of two miles; and so in proportion for a greater or less distance.

From the preceding data the following Table is constructed.

	$	cts.
Digging and throwing out in sandy soil to 7 feet deep per yard cube,	0	10
Ditto, including the whole depth, to 14 feet deep		15
Ditto, to 21 ditto		20
Ditto, in clay or gravel to 7 ditto		20
Ditto, to 14 ditto		25
Ditto, to 21 ditto		30
Ditto, in very strong gravel to 7 ditto		30
Ditto, to 14 ditto		35
Ditto, to 21 ditto		40
Carting away to ¼ mile distance, per yard cube		10
Ditto to ½ mile		15
Ditto to ¾ mile		19
Ditto to 1 mile		22
Ditto to 1 ½ miles		27
Ditto to 2 miles		31
Digging out for foundations, levelling and ramming in the stuff to the walls as they are built, per yard cube		20

DIGGING WELLS.

Wells from 3 feet 6 inches to 4 feet 6 inches diameter, clear of stone work, are dug and built round with dry stone work in proper curbs, in the city and vicinity of New York, to from 20 to 40 feet deep, at 2½ dollars per foot in depth.

NOTE.—24 cubic feet of sand, or 18 cubic feet of earth, or 17 cubic feet of clay, make a ton.

1 yard cube of solid gravel, or earth, contains 18 heaped bushels before digging, and 27 heaped bushels when dug.

Surveyors measure by what they call a yard of 10 cubic feet; but this being merely a local custom, the *cubic* yard should be adopted in all cases.

A Table, shewing the quantity of Water contained in Wells, Cisterns, &c. in proportion to their diameters, at 1 foot deep.

ft.	in.				
3	6	clear of the	diameter, will contain	59	gallons per foot deep.
4	6	ditto	ditto	77	ditto
4	6	ditto	ditto	98	ditto
5	0	ditto	ditto	120	ditto
5	6	ditto	ditto	146	ditto
6	0	ditto	ditto	173	ditto
6	6	ditto	ditto	203	ditto
7	0	ditto	ditto	235	ditto
7	6	ditto	ditto	270	ditto
8	0	ditto	ditto	308	ditto
8	6	ditto	ditto	348	ditto
9	0	ditto	ditto	390	ditto
9	6	ditto	ditto	435	ditto
10	0	ditto	ditto	480	ditto

BKICKLAYERS' AND MASONS' WORK.

LAYING FOUNDATIONS.

The best foundations are rock, gravel, and very stiff dry clay. Those to be guarded against are bog earth, soft clay, and made earth, (no matter how hard.) If the projected building is to have under cellars beneath the basement story, as is now the general practice about New-York, a sufficiently firm bottom to build on is most commonly found, provided the lot be not on ground that has been filled up; but if this be the case, and the intended structure be of any considerable magnitude, the greatest possible care will be necessary to prevent settlements that may endanger not only the beauty, but even the safety of the building. When firmness and durability of the work are, as they ought to be, principal objects, the best remedy for made ground is to dig down to the original gravel in several places along the foundation, and carry up piers of sufficient size to support the building, by throwing arches across from one to the other, at the proper height for the lowest story, with buttresses at the angles to withstand the thrust of the arches. If the depth be so great as to render this impracticable, the trenches for the footings of the building should be made perfectly level all round, and not less than two feet wider than the thickness of the basement walls. The bottom should be rammed down as hard as possible the whole width of the trench, to compress and render the ground as uniformly hard in all parts, as the nature of it will admit. This should not be carelessly done, as it is known that a few heavy blows with a rammer will compress the ground much more than a weight of some tons laid quietly upon the same surface. The sides of the trench should be cut as straight and even as possible; sloping, or inclined from the bottom, so that when the footing is laid with large flat stones, and the remainder of the trench to the height of 18 inches, or 2 feet, filled up with masonry, the walls will not be so likely to sink from the footings fitting tightly between the sides, in the form of a wedge. In London, a foundation composed of *concrete* has been used at the new post office by Mr Smirke, and at the London University, and at St. George's Hospital, by

Mr Wilkins, with complete success. For although the ground on which these buildings were erected, was partly made ground and partly intersected with old sewers and cess pools, and partly on clay, there is not the least appearance of fracture or unequal settlement in any part of them. The manner of proceeding was this: the concrete, was composed of strong fresh burnt lime brought in casks directly from the kiln to the ground, slacked with all possible speed, and immediately mixed up with about eight times the quantity of clean coarse gravel; and as one set of men made up the stuff pretty soft, another set carried it to the trench, and let it fall to the bottom; filling the trench to the depth of about eighteen inches all round the foundations. When this course became set, which required two or three days, another similar course was laid on in the same manner.

As this composition sets quickly, and, like plaster of Paris, possesses the property of swelling as it sets, it acts with considerable force against the sides of the trench, and thus forms two continued courses all round the foundation three feet deep, as hard as stone, and more firmly fixed in the trench than the foundation could be if built of any other material.

The cost of this composition would, if applied in New York, be as under:—

	$	cts.
1 cask of best Thomaston lime	1	50
2 cubic yards of screened gravel	1	50
2 laborers, mixing and putting it into the trench, 2 hours each .	0	37
	$ 3	37

This will produce about 56 cubic feet of concrete, at little more than 6 cents per foot; which is not more than about one-third the price of rough stone work; so that it would be well worth a trial.

Let me earnestly recommend builders to pay particular attention, in all cases, to the laying of foundations, as these are parts which, if defectively or carelessly performed, can never be taken out, altered, or repaired, (as other parts of a building may,) without incurring enormous trouble and expense. And the difference in cost between doing this in the best manner, and in a way barely sufficient to stand, will amount to a mere trifle, compared with its great importance to the stability of the structure.

PARTICULARS RELATIVE TO BRICKWORK.

A bricklayer and laborer can, in a day, lay, in party or inside wall, joints rough, ...	1200 bricks.
in external walls, the joints drawn smooth,	1000 do.
in front walls with facings, taking the inside and outside together, ...	500 do.
in fronts, facings only, in best style, . . .	250 do.
in arches to vaults, cellars, &c.	750 do.
in arches to drains, sewers, &c. exclusive of digging, ...	600 do.
in paving, including levelling the ground,	2000 do.
in paving, laid herring bone, ...	1500 do.

One cart of lime, (3¼ bushels,) and 2 carts of sand, (27 bushels,) will serve to lay 1000 bricks.

A cubic foot of brick work will, with mortar, take 22 bricks.

A superficial foot of facing to fronts will take 8 bricks.

A superficial yard, or 9 square feet of paving will take 42 bricks.

5 cart loads of common building stone, 1 cask of lime, and 2 loads of sand, a mason and laborer, 1½ days each, will produce about 65 cubic feet of stone work.

One bushel of Roman or hydraulic cement will, when mixed with 2 bushels of clean sharp sand, serve to lay 150 bricks. Or, it will cover 4 square yards of plastering on brick work.

The value of brickwork in New-York, is generally estimated at per thousand bricks laid, including labor, mortar, and scaffolding. This practice, taken indiscriminately, must be very erroneous, as the correct value must depend on the labor required to produce an equal quantity of different kinds of work. The most simple and correct way is to take the quantities of the party and internal walls, with the chimney breasts, in cubic feet, and charge this under one head.

The cubic feet in arches to vaults, cellars, &c. under another head.

The cubic feet in front walls, including the facings, under another head.

And the superficial feet of facings charged extra, in proportion to its value, under another head.

In measuring brickwork for the length of party walls, take the dimensions clear of the front and rear walls.

In chimneys, take the width of the breast on each floor, by the thickness projecting into the room, and deduct the vacuity of the fire place only.

In fronts, take the whole length by the height and thickness, and deduct the window openings.

No deductions to be made for plates, bond timber, &c.; but 2 inches in height to be allowed for bedding plates where no brickwork is over them.

In measuring arches of vaults, sewers, &c. add the inside and outside circumferences together, and take half the sum for a mean dimension, which, multiplied by the length and thickness, will give the cubic quantity of brick work.

TO ESTIMATE THE PRICE OF BRICKWORK IN PARTY OR INTERNAL WALLS, THE JOINTS ROUGH.

	$	cts.
1000 common hard bricks delivered, .	5	75
1 cask of Athens lime, ...	1	12½
2 loads of sand, ...	0	50
Bricklayer ¾ of a day, ...	1	12½
Laborer ¾ of a day, ...	0	75
Use of scaffolding, ...	0	12½
	9	37½
Profit, . .	1	62½
	$ 11	00

11 dollars per thousand producing 46 cubic feet, at 24 cents per foot.

BRICKWORK IN EXTERNAL WALLS, THE JOINTS SMOOTH.

	$	cts.
1000 common hard bricks delivered,	5	75
1 cask of Thomaston lime,	1	50
2 loads of sand,	0	50
Bricklayer 1 day,	1	50
Laborer 1 day,	0	87½
Use of scaffolding,	0	12½
	10	25
Profit,	1	75
	$ 12	00

12 dollars per thousand, producing 46 cubic feet, at 26 cents per foot.

BRICKWORK IN ARCHES TO VAULTS, &c.

	$	cts.
1000 common hard bricks delivered,	5	75
1 cask of Thomaston lime,	1	50
2 loads of sand,	0	50
Bricklayer 1½ days,	1	87½
Laborer 1 day,	0	87½
	10	50
Profit,	1	75
	12	25

12 dollars, 25 cents per thousand, producing 46 cubic feet, at nearly 27 cents per foot.

BRICKWORK IN FACING TO FRONTS, LAID WITH FINE MORTAR IN THE BEST MANNER.

	$	cts.
1000 best Poughkeepsie stretchers delivered,	19	50
1 cask of best Thomaston lime,	1	50
1 load of fine clean sand,	1	00
Bricklayer 3½ days,	5	25
Laborer 3 days,	2	62½
Use of scaffolding,	0	25
	30	12½

This will produce 125 superficial feet of facing, at 24 cents per foot; from which deduct the value of a superficial foot of rough work, 9½ cents; the remainder is 14½ cents; which is the price to be charged extra per foot super for the facing.

STONEWORK.

	$	cts.
5 loads of common building stones, of 13 ft. each,	5	50
1 cask of Athens lime,	1	12½
2 loads of sand,	0	50
Mason 1 day,	1	50
Laborer 1 day,	0	87½
	9	50
Use of scaffolding and profit,		90
	$ 10	40

This will produce about 65 cubic feet, at 16 cents per foot.

The above is the usual price for rough stone or rubble work in New York; but in all situations the prices of the work will of course depend on the cost of the materials when delivered; so that by estimating the quantities, as above shown, at their respective prices when wanted, the cost of the work per foot is easily determined.

RECAPITULATION.

	$	cts.
Brickwork in party or internal walls per foot cube,	0	24
Ditto in external walls, the joints drawn, per foot cube,	0	26
Ditto in arches to vaults, &c. ditto.	0	27
Ditto in facings to fronts, with best Poughkeepsie stretchers measured extra upon the face, per foot superficial,	0	14½
Rough blue stonework in mortar, per foot cube,	0	16
Ditto, with hammered stone, in courses, on the face per foot cube,	0	25

BRICKLAYERS' WORK.

LABOR ONLY.

The following prices include the fixing of scaffolds and all attendance of laborers.

	$	cts.
Brickwork in party or internal walls, the joints rough, per foot cube,	0	4
Ditto in external walls, the joints smooth, . ditto, .	0	5
Ditto in arches to vaults, cellars, &c. . . ditto, .	0	7½
Ditto in facings to fronts, in the best manner, per foot super.	0	8
Ditto . ditto, . with bricks of second quality, ditto,	0	6
Stonework in basements, &c. per foot cube, ...	0	5
Ditto with hammered stone, in courses on the face, per ft. cube,	0	11
Camber or semicircular arches, axed off the soffits, and set in mortar for pointing, extra on face, per foot superficial,	0	4
If circular on the plan, add	0	4
Straight, camber, or semicircular arches, cut, rubbed, and set extra on the face, per foot superficial, . . .	0	35
If circular on the plan, add	0	20
Outside splays per foot run, ...	0	3
Birdsmouth ditto	0	3
Cuttings to rakes, per foot superficial, ...	0	4
Ditto to ramps, ditto, ...	0	5
Points of groins, rough cut, per foot run, ...	0	6
Ditto . cut and rubbed fair, per foot run	0	12
Red returns, one course a stretcher, the other a header and closer, per foot run, ...	0	6
Brick nogging between studs, on flat, per yard superficial, . .	0	14
Paving laid flat in sand, levelling ground included, ditto, . .	0	5
Ditto herring bone, ... ditto, . .	0	6
If grouted, add		2
8 inch drain, sides of half a brick, 3 courses high, and flagged top and bottom, per foot run.	0	6
12 inch ditto, . . ditto, ...	0	8
18 inch barrel drains a brick all round, per foot run, . . .	0	20
2 feet . . ditto, ... ditto, . . .	0	25
2.6 . . ditto, ... ditto, . . .	0	30
3.0 . . ditto, ... ditto, . . .	0	37½
Tuck pointing with a neat joint on new work, per foot superficial,	0	4
Ditto to old fronts, including raking out joints and repointing, per foot superficial, ...	0	5½
Brick fronts painted one coat, and the joints drawn white, per yard,	0	3

PRICES TO BE CHARGED AT DAY WORK

IN THE CITY OF BOSTON.

		$	cts.
Bricklayer or Mason,	per day,	1	62½
Ditto . Ditto,	per hour,	0	17
Laborer,	per day,	1	00
Ditto,	per hour,	0	10
Bricklayer employed in fire work, altering smoky chimneys, fixing smokejacks, &c.	per day,	1	75
Laborers at ditto,	per day.	1	00
Best Poughkeepsie stretchers, carting, &c. included,	per hundred,	2	00
Second best . ditto, . ditto, . .	ditto,	2	95
Common hard stocks, . . ditto, . .	ditto,	0	62½
Fire bricks, common size, . ditto, . .	each,	0	07
Thomaston lime, . . . ditto, . .	per cask,	1	75
Athens ditto, . . . ditto, . .	ditto,	1	50
Sand . . . . . ditto, . .	per cart load,	0	50
Mortar . . . . . ditto, . .	per hod,	0	18
Hair . . ditto, . ditto, . .	per bushel,	0	25
Fine stuff . ditto, . ditto, . .	per hod,	0	25
Roman cement . . . ditto, . .	per peck,	0	37½
Blue building stone	per cart load,	1	50
Rubbish carted away	ditto,	0	25
Laths	per bundle,	0	25
Nails	per lb.	0	09

PRICES OF FIRE BRICKS, TILES, &c.

AT THE

SALAMANDER WORKS, CANNON STREET, NEW YORK.

	$ cts.
Fire bricks, ordinary, (Stourbridge size,) 9 inches long, 4½ inches wide, 2½ in. thick, per thousand,	to 55 00
Split, (Stourbridge size,) 9 inches long, 4½ in. wide, 1½ in. thick, per thousand, . .	30 00
Soap, (Stourbridge size,) 9 inches long, 2½ in. wide, 2½ in. thick, per thousand, . .	30 00
Cupola or Compass, various sizes, forming inside diameters, of 16, 18, 24, 32, 36, and 48 inches, ...	40 00 to 120 00

	$ cts.	$ cts.
Fire Bricks, Arch, of various sizes, for forming round, oval, oblique, square, ½ and ¼ circles or segment, Gothic arches, or any other shape required,	30 00 to	60 00
Skew or Butment, for beginning arches,	60 00 to	70 00
Wedge or Bullshead and Key, of various sizes,	60 00 to	120 00
Circular for lining furnaces, cupolas, stoves, &c., from 7 inches to 8 feet diameter, ½ inch to 6 inches thick,		
Furnace caps for air and blast furnaces each,	1 00 to	2 00
Blocks and slab for bakers' ovens; annealing, smelting, and pryroligneic acid furnices; setting steam engines; chemists' use, &c.		
Twear and taphole for Cupola furnaces,		
Tiles for bakers' ovens, 8 in. by 8 in. per hundred,		7 80
—— 10 — 10		12 00
—— 12 — 12		18 00
Green house 8 — 12 grooved		10 00
White lead and paper manufacturers' drying tables, 12 by 12 grooved		150 00
Portable Furnaces, No. 1 extra, to No. 6, from 17 to 8 in. diameter, per dozen,	3 00 to	24 00
Cylinders for stoves from 8 to 14 inches diameter, each,	00 37½ to	00 75
Fire Cement, a most superior article for building furnaces, per bbl.		3 50
Fire Clay, equal to the best Dutch and German,		2 00

N. B. The price of Fire Bricks varies from 6 to 20 cents per 100 cubic inches, according to their shape or size.

STONECUTTERS' WORK.

MEASURING STONEWORK.

The most correct and simple method of obtainig the real value of stone-work, is to take the cubic quantities of stone or marble, and add the value of the labor thereon, whether it be plain work, circular plain, moulded, or circular moulded. This may at first appear to be attended with considerable trouble; but with a little practice it will become perfectly simple, and easily applied to every variety of work.

For the value of stone, without labor, find the number of cubic feet in each piece, and look to the following Table for the price per foot corresponding with the length of the stone; but when in small, or narrow joists, take the number of feet run, of each kind, and find the price corresponding with its description in the Table.

MEASURING WORKMANSHIP.

For plain rubbed face to Ashlers, Steps, Landings, Posts, Water Tables, Cornices, &c., take the superficial measurement, upon all parts of the stone, were worked. Take also, the superficial measurement of the rough beds and joints; and charge each kind of work at their respective prices, as shown in the table of prices. For moulded work to Cornices, Architraves, Imposts, &c., girth the whole face of the moulding, beginning with a string or tape at the extreme edge of the moulding and immerging it into the hollows and quirks, across the whole face. This dimension multiplied by the length will give the superficial feet; and the price will be found in the table, corresponding with its particular description.

For work to shafts of fluted doric columns, first take the plain work to the beds, or ends of the shaft; next, multiply the height of the shaft by three times the lower diameter, and look in the table for the corresponding price of each.

For the Capital, take the plain work to the top and bottom beds, and to the front of the abacus; which, charged as plain. Next, take the circumference, or length round of the ovolo, at its greatest projection; multiply this by the girt of the ovolo and amulets; and find the price per foot superficial in the table. Count the number of circular or elliptical ends to the flutes, and charge them each, at per inch wide across the flute, as shown in the table.

Take all flat, circular work at one and a half times the straight; and when of a quick sweep, twice the straight.

In measuring stone stairs pinned into walls at one end with plain continued soffit. For the cubic quantities of stone, take the length of each step, and multiply it by the width of the tread, and the depth of the riser. For workmanship thereon, add the depth of the end to the length of the top, and multiply this by the girt of the step all round, to give the plain work.

Take the rebate at per foot run, extra.

Cutting out the brickwork, and pinning the steps into the wall, should be done after the brickwork has had sufficient time to dry and settle; but on no account before, as unequal settlements in the brickwork which always takes place more or less, would break off, or at least throw out of level and spoil the appearance of the stairs, if built in the walls as they go up.

AMERICAN MARBLE.

The marble chiefly used in New York for building purposes is brought from the quarries in East Chester; and as raising it in straight, or square blocks is attended with great difficulty and labor, it is generally sent off in very irregular masses; and this difficulty still increasing with the size of the blocks, a great waste of material takes place when converted into works requiring considerable lengths. A further loss also frequently arises from small cracks or veins in the blocks which are imperceptible in the rough state, but often render a block useless for an intended purpose, even after sawing or working. In estimating the price of materials, a per centage upon the prime cost, equivalent to this waste and risk, should therefore be taken into account; and also to cover the expense of landing the stone, of carriage from the wharf to the yard; and of afterwards delivering the work at the building when prepared.

PARTICULARS RELATIVE TO MARBLE WORK.

Landing of Marble from the vessels will cost about 3 cents per foot cube.
Removing ditto from the wharf to the yards, 3 cents
Delivering the work at the building when prepared, about 4 cents
A stonecutter can work of plain face to Marble from 4 to 5 feet sup. in a day
Ditto of moulded work to large cornices, about 1½ feet ditto
Ditto to small cornices . . . . 1 foot ditto
Ditto to large capitals of antæ . . 1 foot ditto
Ditto to small ditto . . . . 9 inches ditto

A laborer can rub and polish with sand about as much as four stonecutters can work.

The employer keeps the tools in repair, which costs upon an average about $1 25 per week for each stonecutter.

TABLE OF THE PRICES OF ROUGH MARBLE.

LENGTHS.			Quarry price per foot cube.	Price to be taken in estimating.
ft. in.	ft. in.		$ cts.	$ cts.
4 0 to	0 0	containing 20 cubic feet or under	0 40	0 60
5 6 to	0 0	" 20 "	0 50	0 75
5 6 to	6 6	" 20 "	0 63	0 95
6 6 to	7 5	" 30 "	0 75	1 12½
7 6 to	9 0	" 40 "	0 88	1 32
9 0 to	10 6	" 50 "	1 00	1 50
10 6 to	12 0	" 60 "	1 13	1 70
Slabs from 4 inches to 6 inches thick, 2 inches white or under, . . . per foot super.			0 30	0 45
6 feet long, 7 inches thick, "			0 40	0 60
6 feet long, 8 or 9 inches thick, "			0 50	0 75
6 feet long, 10 or 12 inches thick, "			0 63	0 95
Flagging, under 4 inches thick, "			0 25	0 37½
Ashler, from 4 to 6 inches thick, and from 7 to 9 inches wide, . . . per foot run.			0 25	0 37½
from 4 to 6 inches thick, and from 9 to 12 inches wide, . . per foot run.			0 32	0 48
from 6 to 8 inches thick, and from 9 to 12 inches wide, . . per foot run.			0 44	0 66
blocks, 9 to 12 inches square on the heads, each			0 37½	0 56
Water table, 6 to 8 inch beds, . per foot run.			0 44	0 66

TABLE OF THE PRICES OF ROUGH MARBLE.—Continued.

	Quarry price per foot cube.	Prices to be taken in estimating.
	$ cts.	$ cts.
Sills and Lintels, 4 to 5 inches thick, 7 to 9 inches wide, 3 to 4 feet long, per foot run.	0 32	0 48
" 4 to 5 inches thick, 7 to 9 inches wide, 4 to 6 feet long, per foot run.	0 44	0 66
" 4 to 5 inches thick, 10 to 12 inches wide, 6 to 8 feet long, per foot run.	0 50	0 75
Posts, 6 by 12 in. 8 to 9 ft. 6 in. long, per foot run.	0 63	0 95
7 by 12, 8 to 9 6 " "	0 75	1 12½
8 by 12 8 to 9 6 " "	0 88	1 32
10 by 12 8 to 9 6 " "	1 00	1 50
12 by 12 8 to 9 6 " "	1 12½	1 68
measuring over the above size, per foot cube	1 25	1 87
Door Sills, 6 to 8 inches thick, in lengths of 6 feet, per foot super.	0 63	0 95
" 6 to 8 inches thick, in lengths of 6 to 8 feet, per foot super.	0 75	1 12½
Steps, 8 inches thick, in lengths of 6 feet to 6 feet 6 in. per foot super.	0 75	1 12½
" 8 inches thick, in lengths of 6 feet 6 inches, to 7 feet 6 inches, . . per foot super.	0 87½	1 31
" 8 inches thick, in lengths of 7 feet 6 in. to 9 ft. per foot super.	1 00	1 50
" for every foot in length over 9 feet increase, per foot super.	0 12½	0 18
Platforms, 3 ft. to 3 ft. 6 in. wide, and 6 ft. to 6 ft. 6 in. long, ... per foot super.	0 75	1 12½
" 3 ft to 3 ft. 6 in. wide, and 6 ft. 6 in. to 7 ft. long . . . per foot super.	1 00	1 50
" 3 ft. to 3 ft. 6 in. wide, and 7 ft. 6 in. to 9 ft. long, ... per foot super.	1 12½	1 68
" for every foot in length over 9 ft. increase. per foot super.	0 12½	0 18
" flagging, 3 in. thick, and under, per ft. super.	0 25	0 37½
Dies, under 12 cubic feet, . . . per foot cube,	1 00	1 50
caps and bases for, . . . per foot super.	0 63	0 95
plinths for, from 10 to 12 in. thick, ditto	0 75	1 12½

By the preceding table it will be seen that the price of marble is proportionate to the length of the blocks; and for works requiring greater lengths than the above, the prices must be got at the quarry, and will depend on the difficulty of raising it in large blocks at the time it is required.

PRICES OF LABOR ON AMERICAN MARBLE.

	Employers' prices, including the repair of tools and rubbing.	Journeymen's prices for labor only.
	$ cts.	$ cts.
Plainwork, to beds and joints of ashler, per foot super.	0 30	0 22
" to face of ashler, and rubbed, ditto,	0 45	0 33½
" ditto, and set complete, ditto,	0 50	0 37½
" flat sunk rustics, per foot run.	0 20	0 15
" to window sills and lintels, rubbed, per foot super.	0 40	0 30
" to weathered cornices, water tables, &c. per foot super.	0 60	0 45
" to beds, or ends of shafts of large columns, per foot super.	0 60	0 45
" to beds, or ends of shafts of small columns, per foot super.	0 50	0 37½
" to shafts of antæ, steps, dies, &c. ditto.	0 60	0 45
Moulded work, (ovolo) to lintels, architraves, imposts, &c. per foot super.	1 25	0 94
" (ogee and bead, or ovolo and quirk) to ditto per foot super.	1 50	1 12½
" to large cornices with corona, crown, and bed moulds, per foot super.	1 50	1 12½
" to small ditto, or complex mouldings, per foot super.	2 00	1 50
" to caps and bases of large antæ, ditto,	2 20	1 75
" to ditto of small antæ, . ditto,	2 50	1 87½
" circular and fluted shafts of large Grecian Doric columns taken 3 times the lower diameter by the height of the shaft, per foot super.	0 80	0 60
" ditto to smaller size columns, ditto,	1 00	0 75
" ovolo with annulets to Doric cap, ditto,	2 00	1 50
" ends to flutes (per inch across the flute) each	0 12	0 09
" laurel wreaths on frieze, 18 in. diameter, ... each	15 00	11 25
" ditto . . . 12 in. ditto	13 00	9 75
" ditto . . . 9 in. ditto	11 00	8 25
" Grecian suckle and lotus ornament carved on frieze, per foot super. on the face, ...	12 00	9 00
Cutting out brickwork, and pinning in the steps of geometrical marble stairs, per foot run, along the soffit . .	0 50	0 35
Rebate to steps of marble stairs, per foot run .	0 22	0 16
Sawing American marble in blocks over 9 feet long, per foot super.	0 57	0 43½
Ditto, in blocks under 9 feet long, ditto,	0 50	0 37½

APPLICATION OF THE PRECEDING RULES AND PRICES OF MARBLE WORK.

Find the value of a piece of Ashler work, 12 feet long, 4 feet high, and 6 inches thick, in four courses, containing 10 upright joints.

				$	cts.
4)12.0	48.0	Run of 6 in. rough ashler, 12 in. wide, at 48 cts.		23	04
12.0					
4.0	48.0	Super plain face and rubbed	45	21	60
8)12.0					
.6	48.0	Beds			
10) 1.0					
6	5.0	Joints			
	53.0	Super. plain beds and joints	30	15	90
				60	54

This will produce 48 superficial feet on the face at $1 26 per foot.

By this arrangement of the Dimension Book, the quantity of materials, and the workmanship thereon, are shown in a very clear and simple manner. Thus for the value of the rough marble above, 4 (the number of courses) is placed in the left hand column, in a parenthesis before 12 ft. (the length) to indicate that 12 is to be multiplied by 4, producing 48 feet run of the rough Ashler; this is placed in the right hand column, and the price thereof found in the table of prices to be 48 cents per foot. For the workmanship, 12 ft. (the length) is placed over 4 ft. (the height) in the left hand column; which being multiplied by each other produce 48 superficial feet; this is placed in the right hand column, and the price of plain face rubbed to Ashler, in the table of prices of labor, found to be 45 cents per foot. The number of feet, to beds and joints, with the price thereof, are found in the same manner.

EXAMPLE 2.—Find the value of a Grecian Doric fluted column 11 feet high, 18 in. diam. at bottom, 14 in. diam. at top of shaft; the cap 9 in. deep and 1 foot 8½ in. square of abacus, with sunk neck and elliptic ends to the flutes.

			$	cts.
10.6				
1.6				
1.6	23. 7	shaft		
1.9				
1.9				
.9	2. 3	cap		
	25. 10	cubic feet of marble . . at $1.50	38	75
1.6				
1.6	2. 3	lower bed		
1.2				
1.2	1. 4	upper bed		
	3. 7	super. plain work to ends of shaft . 50	1	79
ft. in.				
3 × 1 6 = 4.6				
10.3	46. 0	super. circular and fluted work to shaft 1 00	46	00
2)1.9				
1.9	6. 1	top and bottom beds of cap		
4)1.9				
.6	3. 0	faces of abacus		
	9. 1	super. plain work to cap . . 50	4	54
5 .3				
.5	2. 4	super. circular ovolo and annulets to ditto 2.00	4	66
		No. 20 circular ends to flutes, (2½ inches wide across,) each . 30	6	00
			$101	74

10 ft. 6 in. being the length, and 1 ft. 6 in. the side of the block required to produce the Shaft; these dimensions being multiplied by each other will produce 23 ft. 7 in. cube. Again, the stone required for the Cap will be 1 ft. 9 in. square, and 9 in. thick; these dimensions being multipled as before, give 2 ft. 3 in. cube; which added to the 23 ft. 7 in. above, gives 25 ft. 10 in., the cubic quantity of the marble. The price will be found in the Table for blocks of this length, to be $1 50 per foot.

For the workmanship, 1 ft. 6 in. being multiplied by 1 ft. 6 in. gives 2 ft. 3 in., the size of the lower bed, and 1 ft. 2 in. by 1 ft. 2 in. gives 1 ft. 4 in., the upper bed; these added together give 3 ft. 7 in. as the plain work to the ends of Shaft; by turning to the Table of prices for workmanship, we find the price for this to be 50 cents per foot super. Again, for the work to the sides of Shaft, 3 times 1 ft. 6 in. is 4 ft. 6 in., (the mean circumference;) which multiplied by 10 ft. 3 in. (the height) gives 46 superficial feet. For this kind of work we find the price to be in the Table for small columns $1 00 per foot. In the same way every other part is measured, and the price proportioned thereto to be found in the Tables.

The following List, deduced from the preceding data, may be useful in estimating:

						$ cts.
Ashler, plain marble, 6 in. thick, 12 in. deep, rubbed					per ft. super.	1 25
——— with sunk flat rustics on one edge					per ft. super.	1 45
	ft. in.	ft. in.	in.	in.		
Steps, plain,	6.0	to 6.6 long,	12	by 8	rubbed top and riser, per ft. run	2 12½
"	6.6	to 7.6	12	by 8	ditto	2 28
"	7.6	to 9.0	12	by 8	ditto	2 56
"	For every foot over 9 feet long, increase the price					0 18
Platforms,	6.0	to 6.6 long,	3.0	to 3.6	wide rubbed top and edges . . . per ft. super.	1 72½
"	6.6	to 7.0	3.0	to 3.6	ditto	2 10
"	7.6	to 9.0	3.0	to 3.6	ditto	2 28
"	For every foot in length over 9 feet, increase the price				ditto	0 18
"	Flagging, 3 inches thick, or under, rubbed face,				ditto	0 75
"	Ditto,	4	ditto		ditto	0 82½
Door Sills,	6.0 long, or under;		6 to 8	thick	rubbed, per foot super. on the top	2 00
"	6.0	to 8.0 long;	6 to 8	ditto	ditto	2 12
Water Table,	10 inches high;		6 to 8	ditto,	per foot run	1 00
Sills and Lintels, plain rubbed	3 to 4 ft. long,		7 to 9	in. wide,	4 to 5 in. thick, . . . per pair	8 00
"	if moulded lintel extra .				ditto	3 00
	ft. in.	in.	in	in.	in.	
"	Ditto 4.6	long, 7 to 9	wide,	4 to 5	thick, ditto	10 00
"	if moulded lintel extra .				ditto	3 00
"	Ditto 5.6	7 to 9		4 to 5	thick, ditto	13 00
"	moulded lintel extra .				ditto	3 25
"	Ditto 6.6	9 to 10		5 to 6	thick, ditto	16 00
	moulded lintel extra .				ditto	3 37
"	Ditto 8.0	10 to 12		5 to 6	thick, ditto	20 67
	moulded lintel extra .				ditto	3 50
	ft. in.	ft. in.	in.	in.		
Posts,	8.0	to 9.6 long,	12	by 6,	rubbed all round, per ft. run,	2 48
"					rubbed 2 sides only, ditto	2 18
"	Ditto		12	by 7,	rubbed all round, ditto	2 75
"					rubbed 2 sides only, ditto	2 43
"	Ditto		12	by 8,	rubbed all round, ditto	3 00
"					rubbed 2 sides only, ditto	2 62
"	Ditto		12	by 10,	rubbed all round, ditto	3 25
"					rubbed 2 sides only, ditto	2 80
"	Ditto		12	by 12,	rubbed all round, ditto	3 50
"					rubbed 2 sides only, ditto	3 00

OF FOREIGN MARBLE.

	Statuary	Egyptian, or Black and Gold.	Irish Black.	White Veined	Dove.	Burdilla Dove.
	$ cts.	$ cts. $ cts.	$ cts. $ cts.	$ cts. $ cts.	$ cts. $ cts.	$ cts. $ cts.
Price of marble, including the expense of carriage from the wharf to the yard, at per cube foot,	10 00	5 00 to 12 00	2 50 to 5 00	2 00 to 3 50	2 00 to 3 50	2 00 to 3 50
Sawing marble, . . . at per foot super.	0 31	0 37½	0 37½	0 31	0 31	0 37½
Sanding and rubbing large slabs, ditto,	0 10	0 10	0 10	0 10	0 10	0 10
Polishing . . ditto, . ditto,	0 15	0 15	0 15	0 15	0 15	0 15
Sanding and rubbing small slabs, or chimney-piece work, ... at per foot super.	0 12	0 12	0 12	0 12	0 12	0 12
Polishing small slabs, . . . ditto,	0 16	0 18	0 18	0 16	0 16	0 17

N. B. — The cost of removal from the wharf to the yard, is about 1 dollar per ton.

Pure Italian Statuary Marble is to the Sculptor an invaluable material, as the quality of it adds lustre to the workmanship, and enables the artist to command the highest price for his labor, ingenuity and taste; it is seldom used about buildings, except for chimney pieces of a superior description; and those, when ordered to original designs, should be made at stipulated prices, to avoid the necessity of measurement.

The superior effect that would result from the use of foreign marble as a lining or covering to the outsides of buildings, might be economically produced, by cementing the marble in thin slabs against the walls, and securing it with copper cramps. This covering, if properly managed, would last for a great length of time.

SLABS FOR CABINET WORK, &c.

	$ cts.	$ cts.
Italian veined table tops of 1 inch thick, per foot super. from	1 50	to 2 00
Irish black, or Italian dove table tops,	1 75	to 2 00
Statuary	3 00	to 4 00
Egyptian, or black and gold ditto,	3 50	to 5 00
If in slabs of more than 10 super feet, add extra per foot,		0 25
White, black, or veined pier table columns, per pair,		10 00
Ditto, ditto, pilasters, ditto,		5 00
Egyptian, or black and gold columns, as above, ditto,		14 00
Ditto, centre table columns, each		10 00
Ditto, pilasters, ditto,		7 00
Common Ionic caps for columns to chimneys, per pair,		11 00
Angular ditto, ditto, ditto,		35 00
Common pilaster caps, ditto, ditto,		9 00
Ionic caps to columns, (from the temple on the Illisus,) with fluted necks,		30 00
Ditto, (from the erechtheion,) with suckle and lotus ornament on the neck,		50 00
Corinthian caps, to columns of statuary, per pair,		200 00
Ditto, to pilasters, ditto,		100 00
Carving marble mouldings, per foot run. from	4 00	to 5 00
Ionic bases to columns, per pair,	2 00	
Ditto, to pilasters, ditto,	1 00	
Turned pateras, ditto,	2 00	
Plain necks to columns, ditto,	2 00	

CHIMNEY PIECES.

	$ cts.	$ cts.
Common bedroom chimney pieces, prepared and fixed, each from	25 00	to 50 00
Superior ditto, with moulded pilasters, ditto	50 00	to 60 00
Common dining-room, ditto, ditto	60 00	to 80 00
Ditto, ditto, with columns, ditto	80 00	to 120 00
Superior ditto, got up in best style, of Irish black and Egyptian,	150 00	to 250 00
Common facings to fireplaces, including jambs, mantles and hearths, per foot super.	87½	to 1 25
Rubbed Italian marble facings to fronts of houses fixed with copper cramps, and cemented to the wall, per foot super.	1 50	
Ditto, ditto, of American marble, ditto,	1 25	
Dotted and diamoned marble floors, complete, ditto,	1 50	
Ditto, plain,	1 25	

LIST OF WORKMEN'S PRICES FOR POLISHING FOREIGN MARBLE.

	$ cts.
Polishing plain work, per foot super.	0 15
" moulded column shelf, each	1 25
" plain ditto, ditto	1 00
" fluted ditto, ditto	1 12½
" moulded pilaster shelf, each	1 00
" plain ditto, ditto	0 75
" circular bed mould with caps, each	1 25
" straight bed mould each	1 00
" circular friezes, do.	0 75
" straight do. do.	0 37½
" plain friezes, circular, each	0 37½
" ditto, straight, do.	0 25
" architrave to colm. straight, each	0 87½
" ditto, to circular pattern, each	1 12½
" ditto, to pilaster, each	0 62½
" soffit, to circular pattern, plain, each	1 00
" ditto, to straight ditto, each	0 50
" ditto, pilasters, do.	0 37½
" moulded circular soffit, each	1 50
" ditto, straight, do.	0 75
" columns, do.	0 87½
" plinths, per pair	0 25
" sub plinths, ditto	0 62½

	$ cts.
Polishing tablet, dbl. moulded, each	1 00
" single moulded do.	0 75
" frieze blocks, per pair	1 25
" pilaster ditto, ditto	0 87½
" top mantle, moulded, each	0 75
" ditto, plain, ditto	0 18¾
" top slip, moulded, each	0 30
" ditto, plain, ditto	0 20
" pilasters, moulded, each	0 75
" ditto, plain, ditto	0 37½
" moulded pilaster plinths, each	0 62½
" pilaster plinths, beaded, each	0 30
" profiles, outside, per pair	0 37½
" ditto, inside, ditto	0 30
" abacus, ditto	0 30
" inside architraves, per set,	2 00
" square tables, from 3 ft. to 3 ft. 6 in. and 1 ft. 4 in. to 1 ft. 7 in. wide, each	0 75
" circular ditto, from 2 ft. 10 in. to 3 ft. diameter each	1 75
columns and pilasters to table, per set	1 50

OF GRANITE.

This excellent material, which can be obtained in blocks of any required dimensions, and readily split into square or flat pieces of any length or shape, is fully deserving the encouragement it has lately obtained, and which is every day becoming more extensive.

The white granite, which is most easily wrought, is brought from Hallowell, Maine, and costs at the quarry from 48 to 50 cents per cubic foot. Ths cost of freight to Boston differs from two and a half to three dollars per ton of 14 cubic feet. The blue or Quincy granite costs at the quarry, 30 cents per cubic foot.

In this material, as well as in marble, a sufficient allowance must be made upon the price to cover the various contingent expenses attending it. A material loss in measurement arises from the circumstance of the cubic quantities being taken rather by weight than by correct measurement to determine the value of the freight; it consequently seldom happens that a block turns out to contain as many cubic feet as are marked upon it.

What has been before observed on estimating the value of rough marble will also apply to this; and 50 per cent upon the cost of the granite, when delivered at the wharf, will be no more than equivalent to the losses, waste, and other expenses on the stone.

MEASURING GRANITE WORK.

For the cubic quantities of the material, proceed as before shown for measuring marble; and also in measuring the work upon it, take the plain *fine* face, and plain *rough* faces separately on all parts of the stone where worked, which being reduced to superficial feet, charge them respectively at their corresponding prices shown in the following table.

In moulded work girt the mouldings as before described; and having found their superficial contents, charge them at their respective prices as shown in the table.

PARTICULARS RELATIVE TO GRANITE WORK.

A stonecutter can work of plain rough face from 16 to 18 superficial feet in a day.

He can work of fine finished face from 6 to 8 feet in a day.

At granite work the employer furnishes and keeps the tools in repair, which costs about 2 dollars per week for each workman.

The PRICE OF GRANITE, as it should be charged per cubic foot in all measurements, &c. is ascertained as under :—

14 cubic feet, at the quarry, costs at 50 cents per foot, . .	$ 7 00
Freight of ditto (average)	3 00
	10 00
Add 50 per cent for waste and profit, . .	5 00
	$ 15 00

This will produce about 13 cubic feet of finished work, at $1 15 per foot.

TABLE OF THE PRICES OF WORK ON GRANITE.

	Employers' prices, including the providing and keeping tools in repair.	Journeymen's prices for labor only.
	$ cts.	$ cts.
Plain work, rough, to beds and joints of ashler, backs steps, ends of lintels, posts, and all other parts not worked fine, per foot super.	0 15	0 12
" beds to shafts of columns, ditto,	0 40	0 30
" fine face to posts, lintels, sills, fascias, steps, cornices, and all other work of narrow dimensions, . . per foot super.	0 50	0 40
" fine face, to platforms, and all other works of large faces, . per foot super.	1 00	0 75
Moulded work to lintels, architraves, imposts, &c. (ovolo) . . per foot super.	1 25	1 00
" ditto, ditto, (ogee and bead, or ovolo bead and quirk,) per foot super.	1 67	1 33
" ditto, to large cornices, with corona, crown, and bed moulds, per foot super.	1 67	1 33
" ditto, to small cornices, or complex mouldings, . per foot super.	2 00	1 50
" ditto, to caps and bases of large antæ, per foot super.	2 50	2 00
" ditto, to ditto, of small ditto, per foot super.	2 75	2 25
" circular and fluted shafts of Grecian Doric columns, (large size,) taken 3 times the lower diameter by the height of shaft, . . . per foot super.	0 75	0 55
" ditto, to smaller sized columns, ditto,	0 87	0 65

TABLE, Continued.

	Employers' prices, including the providing and keeping tools in repair.	Journeymen's prices for labor only.
	$ cts.	$ cts.
Moulded work, circular ovolo with annulets to Doric cap, . . . per foot super.	2 25	1 75
" ends to flutes, (per inch wide across the flute,) . . . . . each	0 15	0 12
" laurel wreaths, carved on frieze, 9 in. diameter, ... each	15 00	12 00
" laurel wreaths, carved on frieze, 12 in. diameter, ... each	18 00	13 00
" laurel wreaths, carved on frieze, 18 in. diameter, ... each	20 00	15 00
" Grecian suckle, and lotus ornament, carved on frieze, at per foot super. on the face,	20 00	15 00
Fixing and setting granite work in posts, lintels, &c. per foot cube	0 15	0 10
" " " to landings, steps, ashlers, &c. per foot cube	0 12	0 09
Working rebates 1 inch by 2, or less, per foot run.	0 33	0 25

Working the blue granite costs about one and a half times the price of white.

APPLICATION OF THE FOREGOING RULES AND PRICES OF GRANITE WORK.

EXAMPLE 1.—Find the value of a piece of ashler work, 12 feet long, 4 feet high, and 6 inches thick, in four courses, containing 10 upright joints.

				$ cts.
12 0 4 0 6	24 0	Cube granite, . . at $ 1 15 per foot,		27 60
12 0 4 0	48 0	Super. plain fine face,	40 "	19 20
8)12 0 6	48 0	Beds.		
10) 1 0 6	5 0	Joints.		
	53 0	Super. plain rough to beds and joints, at 13 cents per foot,		6 89
		This will produce 48 superficial feet, at $1 12 per foot,		$ 53 69

EXAMPLE 2.—Find the value of 4 granite posts to a store front, 12 feet high, 14 inches by 12 inches square; the two outside posts to have each one side and one face worked *fine;* the other side and face rough. The two centre posts to be worked fine all round. The lintel in 3 pieces; in all 25 feet long, and 18 inches by 14 inches square, having one side and face worked

fine, the other side and face rough. And the sill, also in three pieces; in all 25 feet long, and 14 inches by 8 inches square; having one side and one edge rough, the other side and edge worked fine. Fixed and set complete.

				$ cts.
25 0				
18				
14	43	9	Lintel.	
25 0				
14				
8	19	5	Sill.	
4)12 0				
14				
12	56	0	Posts.	
	119	2	Cubic feet of granite at $1 15	136 94
8) 1 2				
1 0	9	4	Ends of posts.	
6) 1 2				
8	4	8	Ends of sill.	
6) 1 6				
1 2	10	6	Ends of lintel.	
25 0				
1 10	45	10	Rough, to sill.	
25 0				
2 8	66	8	Rough, to lintel.	
2)12 0				
2 2	52	0	Rough, to outside posts.	
	189	0	Superficial feet of plain rough work at 13	24 57
2)12 0				
4 4	104	0	Centre posts.	
2)12 0				
2 2	52	0	Outside posts.	
25 0				
1 10	45	10	Sill.	
25 0				
2 8	66	8	Lintel.	
	268	6	super. feet of plain fine work to narrow face, at 40 cents,	107 40
				$ 268 91
			Setting and fixing 119 cubic feet, at 10 cents,	11 90
				$ 280 81

EXAMPLE 3.—Find the value of a Granite Platform, 8 feet long, 4 feet wide, and 8 inches thick; the top and three sides worked fine, the remainder rough. And also of one step under ditto, 8 feet long, 12 inches wide, and 8 inches thick, worked fine on the top, face, and ends; all set and fixed complete.

			$ cts.
8 0			
4 0			
8	21 4	platform.	
8 0			
1 0			
8	5 4	step.	
	26 8	cubic granite, at . . $1 15	30 66
8 0			
4 0	32 0	platform.	
16 0			
8	10 8		
9 4			
1 0	9 4		
8 0			
8	5 4		
	57 4	super. feet of fine work to wide face, at 37½	21 50
8 0			
4 0	32 0	platform.	
8 0			
8	5 4		
8 0			
1 8	12 4	step.	
	49 8	super. feet of rough work, at 13	6 45
			58 61
		Setting and fixing 26 cubic feet, at 8	2 08
			$60 69

THE FOLLOWING LIST, CALCULATED FROM THE PRECEDING DATA, MAY BE USEFUL IN ESTIMATING.

	Employers' prices, including all materials and tools.	Journeymen's prices for labor only.
	$ cts.	$ cts.
Granite posts, for store fronts, 12 feet long, 14 by 12 in. square, worked fine all round, each	37 20	15 88
" 2 sides fine and 2 rough, "	30 18	10 68
" 11 feet long, 14 by 10 in. square, fine all round, each	30 15	13 44
" 2 sides fine and 2 rough, "	24 21	9 04
" 10 feet long, 12 by 10 in. square, fine all round, each	24 45	11 20
" 2 sides fine and 2 rough, "	19 50	7 50
" 9 feet long, 12 by 9 in. square fine all round, each	20 55½	9 63
" 2 sides fine and 2 rough, "	16 29	6 41
Lintels, 25 feet long, in 3 pieces, 18 by 14 in. 2 sides fine, each	86 99	27 86
" " 16 by 14 "	78 34	26 07
" " 16 by 12 "	70 28	24 26
" " 14 by 12 "	63 00	22 49
Sills or thresholds to ditto, 25 feet long, in 3 pieces,		
" " 14 by 8 in. 2 sides fine, each	47 22	18 81
" " 12 by 8 "	43 35	18 68
" " 12 by 6 "	34 63½	15 31
Plain window lintels and sills, for 3 ft. 8 in. openings, or less, per pair,	5 64	2 50
Slip sills, 4 to 6 in. rise, per foot run,	0 81	0 40
Moulding to window lintel, "	1 33	1 00
Belt or string course, from 4 to 6 in. rise, "	0 68	0 30
Water table, 10 in. wide, "	0 75	0 35
Ashler, measured upon the face, per foot super.	1 12	0 37½
Cornices, from 4 to 6 in. high, per foot run.	1 61	1 00
Pilaster capitals, moulded, 4 in. high "	1 50	1 12½
" " 5 " "	1 67	1 25
" " 6 " "	1 83	1 37½
" " 7 " "	2 00	1 50

Labor to rebates of ditto, when fine, the same price as the moulding; when rough, half the price.

N. B. The above prices are exclusive of the setting and fixing, but include the carriage to the building.

PARTICULARS RELATIVE TO BROWN OR CONNECTICUT STONE.

A stonecutter can work of plain face, to ashler, water tables, sills, lintels, pilasters, steps, &c. about 12 superficial feet in a day. He can work of moulded work, about from 3 to 4 feet super. A laborer can rub as much as three men can cut; keeping the tools in repair, costs about $1.25 per week for each man.

A very fine brown stone from Patterson has lately been introduced, which looks well when polished; but it costs about the same as marble, and is certainly not so beautiful for any purpose as the marble.

PRICES OF CONNECTICUT STONEWORK.

	$ cts.
Ashler, from 4 to 6 in. thick, per foot super.	0 37½
" rubbed, "	0 40
" done in regular bond, "	0 43
" droved, "	0 37½
" tooled, "	0 43
" flat sunk, rusticated edge, per foot run.	0 18
" round edge, "	0 25
Corners returned header and stretcher, to be measured 10 inches,	
Coping, not more than 11 inches wide and 2 in thick, per ft run.	0 21
" when more than 11 in. wide and from 2½ to 3 in. thick, per foot super.	0 25
" " 3½ to 4 in. thick, "	0 31
" " 5 " "	0 37½
" " 6 " and all over do. "	1 00
" basins " 8 " "	1 12½
" for chimney tops, 4 in. thick, cut plain, per foot run.	0 37½
" rebated, "	0 50
" blocking course, "	0 31
Flagging for pavements, per foot super.	0 22
" for kitchen hearths, "	0 25
" tooled, "	0 27½
" for stoops, "	0 25
" for cistern bottoms, measured diam. by diam. "	0 20
" neck for cisterns, "	0 25
Curb stone, tooled, "	0 40
" for vault mouths, "	0 31
" for round windows, "	0 31
" for garden, "	0 18
Gutter stone, "	0 50
Grave stones, measured whole length and breadth, "	0 50

PRICES OF CONNECTICUT STONEWORK.—Continued.

	$ cts.
Grate stone for vault mouths, ... "	0 62½
Hook stone for store windows, ... each "	0 50
" for store doors, ... " "	0 75
" to run through the wall, ... " "	1 00
Jambs for store doors, or windows, (of steps) to be measured 4 inches each way beyond the rebate, and charged at the same price of steps the same length.	
" moulded and polished, front edge, add per foot run.	0 25
" (of steps) for kitchen fireplaces, ... per foot run.	0 42
" (triangular) for cellar doors, 6 inches thick, to be girthed at the centre, the top edge and both sides measured, per foot super.	0 50
" when not more than 2 feet wide at the wide end, to be girthed ¼ from the wide end, measured per foot super.	0 50
Imposts for arches, tooled, ... each,	0 62½
" for recessed doors, ... "	1 25
" panelled, ... "	0 75
" for store doors cut square, ... per pair,	0 50
" " panelled . . . . . "	0 75
" coarse polished, ... per foot run.	0 50
Lintels, of steps, the same price as steps, . . . "	0 42
Platforms, under 6½ ft. long, 3 ft. 2 in. to 3 ft. 6 in. wide, cut plain, per foot super.	1 00
" " 8 ft. long, 4 ft. 6 in. wide, cut plain, "	1 50
Moulded edge to platforms, ... per foot run.	0 25
Rustics, 2 feet long, 12 inches head, ... per foot super.	0 87½
" for kitchen fireplaces and store doors, "	0 62½
Steps under 6½ feet long, cut plain, ... "	0 87½
" 7 feet long, ... "	1 00
Moulded nose to steps . . . . . per foot run.	0 25
Scrowl ends to steps, (extra each,) . . . . . "	1 25
Steps for circular stairs, to be girthed ¼ of their length from the broad end, the same as steps of same length.	
" droved for areas, ... per foot super.	0 87
" rough droved for cellars, not less than 6 in. thick, "	0 75
" " under 6 inches thick, "	0 50
Sills for windows, 4½ in. thick, polished, ... per foot run.	0 40
Lintels for windows or doors, moulded and polished, "	1 00
Door sills, or water tables, charged same as steps,	
Stones for oven mouths, ... each,	1 50
String stone 2½ inches thick, over water table, per foot run.	0 25
Fascia 10 inches high or under, polished, . . . "	0 42
Mantles, jambs, slips, &c., to fireplaces, 7 inches wide, or over, per foot run.	0 37½
Boat funnels, and stove pipe stones, ... each,	1 15
" under 4 inches thick, ... "	1 00
Basins, ... per foot. super	0 75
" for cesspool, ... "	0 50

PRICES OF CONNECTICUT STONEWORK.—Continued.

	$ cts.
Base course, 6 inches high and under, ... per foot super.	0 37½
Architrave, moulded in pieces for doorways, . . per foot run.	1 75
Circular " " " "	3 00
Panelled blocks for . . . . " each	1 50
Key stone blocks, panelled, ... "	8 00
A common size doorway complete, of the above description, will cost about	90 00
Silver gray flagging, from Hartford, cut and laid, per foot super.	0 31
" curb stone, cut and laid, "	0 40
Paving with round pebbles, as done in the public streets, per yard super.	0 25

PLASTERERS' WORK.

Perhaps there is not any artificer's work so easy to measure as this, nor any so difficult to value, as the ornamental parts; but where a regular system is adopted, this apparent difficulty ceases by degrees, as persons become familiar with the subject.

The Author hopes that the following methods will meet with general approbation, as he is convinced that in no other way can the correct value of cornices, ornaments, &c. be obtained with less trouble.

In measuring ceilings, take the dimensions from wall to wall, deducting one projection of the cornice each way.

From the above dimensions, (and not from the wall line,) take the round of the room for the length of the cornice.

Deduct the projection of the chimney breast from the ceiling.

Girt all cornices, or moulding, from the running mould, or from the ceiling to the wall line.

Take all plain or moulded cornices, &c. under 9 inches girt, by the running foot, and all above that girt by the superficial foot.

The plain parts of ornamental cornices should be first taken as plain, and the several enrichments therein taken at their separate values, per foot run; which, added to the price of the plain moulding, will give the correct value per foot run. of the whole cornice complete.

For each angle exceeding 4, in a room charge extra; the value of one foot run. of the cornice.

In measuring walls and partitions, take the girth round the room for a length; and from the top of skirting grounds to half way up the cornice, for the height; out of which deduct the doors, windows, and fireplaces.

When enrichments are modelled from original designs, the expense of the modelling should be paid for extra.

PARTICULARS RELATIVE TO PLASTERING.

A plasterer can nail on of lathing in a day . . .	50 yds. sup
Ditto. can scratchcoat, in a day, with two laborers to make up and carry the stuff	150 " "
Ditto, can float, the second browncoat, per day, with one laborer to mix up and carry the stuff	75 " "
Ditto, can set, or hard finish, in a day with a laborer four hours to prepare and carry the stuff	75 " "
One bushel of Roman cement, mixed with two of clean sharp sand, will cover four square yards of plastering.	
One cwt. of mastic, and one gallon of linseed oil, will cover $3\frac{1}{4}$ superficial yards of plain work, $\frac{3}{8}$ of an in. thick.	

COST OF ONE HUNDRED AND FIFTY YARDS OF RENDER, AND SET ON BRICKWORK.

5 casks of lime	*a* $1	50	$7	50
8 loads of sand	0	25	2	00
5 bushels of hair	0	25	1	25
Plasterer 3 days	1	$62\frac{1}{2}$	4	$87\frac{1}{2}$
Laborer $2\frac{1}{2}$ days	1	00	2	50
			18	$12\frac{1}{2}$
20 per cent. Profit			3	$62\frac{1}{2}$
			21	75

$21.75 for 150 yards = $14\frac{1}{2}$ per yard :

COST OF ONE HUNDRED AND FIFTY YARDS OF LATH, PLASTER, AND SET.

			$	cts.
5 casks of lime	at $ 1	50	7	50
8 loads of sand	0	25	2	00
5 bushels of hair	0	25	1	25
3000 laths	2	00	6	00
30 lbs. of nails	0	$07\frac{1}{2}$	2	25
Plasterer $5\frac{1}{2}$ days . . .	1	$62\frac{1}{2}$	8	93
Laborer $2\frac{1}{2}$ days . . .	1	00	2	50
			30	43
20 per cent profit. . .			6	08
			$ 36	51

$ 36.51 for 150 yards = $24\frac{1}{3}$ cents per yard.

COST OF ONE HUNDRED AND FIFTY YARDS OF PLASTER, FLOAT, AND HARD FINISH ON BRICKWORK.

			$	cts.
8 casks of lime	at $1	50	12	00
11 loads of sand.	0	50	5	50
6 bushels of hair	0	25	1	50
Plasterer 5 days	1	62½	8	16½
Laborer 5 days	1	00	5	00
			32	12½
20 per cent profit			6	42½
			38	55

$ 38.55 per 150 = 25⅔ cents per yard.

COST OF ONE HUNDRED AND FIFTY YARDS OF LATH, PLASTER, FLOAT AND HARD FINISH.

			$	cts.
8 casks of lime	at $ 1	50	12	00
11 loads of sand	0	50	5	50
6 bushels of hair	0	50	1	50
3000 laths	2	00	6	00
30 lbs. of nails	0	07½	2	25
Plasterer 8 days	1	62½	12	00
Laborer 5 days	1	00	5	00
			45	25
20 per cent profit			9	05
			54	30

$ 54.30 for 150 yards = 36½ cents per yard.

THE FOLLOWING LIST OF PRICES IS MADE FROM THE COST OF MATERIALS AS UNDER.

Thomaston lime per cask,	$ 1 50	Sand per load,	$ 0 50
Hair per bushel,	0 25	Laths per thousand	2 00
Nails per pound,	0 7½	Plaster per bushel,	0 75
Plasterer per day,	1 62½	Laborer per day,	1 00

	Employers' prices for materials and labor.	Journeymen's prices for labor only.
PLASTERING ON BRICKWORK.		
Rendering one coat only, . . per yard super.	0 10	0 02½
Ditto " " and set, . "	0 14½	0 04½
Ditto " " " circular, "	0 18	0 06½
Ditto floated second coat, and set with putty, per yard super.	0 20	0 05½
Ditto " " " circular, "	0 25	0 09
Ditto floated, and set with stucco or hard finish, per yard super.	0 25½	0 08½
Ditto " " " circular, "	0 30	0 10
Ditto " " " to groins, per foot super.	0 06	0 02
Ditto " " " to spherical heads of niches, per foot super.	0 09	0 04
PLASTERING ON LATHWORK.		
Lathing only, including nails, per yard super.	0 10	0 03
Ditto and one coat of plaster, . "	0 20	0 05½
Ditto and set, ... "	0 24½	0 07½
Ditto circular, ... "	0 31	0 09½
Ditto two coats, floated and set with putty, "	0 32	0 09
Ditto " set with stucco, or hard finish, in best manner, per yard super.	0 36½	0 11½
Ditto circular, ... "	0 41	0 13
Ditto to groins, ... per foot super.	0 08	0 03½
Ditto spherical to domes, . . "	0 09	0 05
Ditto to heads of niches, . . "	0 12	0 06½
STUCCO REVEILS.		
Stucco reveils to windows, 4 inch face, per foot run.	0 08	0 04
Ditto circular, ... "	0 09	0 05
Ditto straight, 8 inch face, . . "	0 12	0 06
Ditto circular, ... "	0 13	0 08
PUGGING OR DEAFENING.		
Coarse stuff, and chopped hay, 1½ inches thick, on sound boarding, the plaster, and all labor, per yard,	0 12	0 09
Ditto on laths, the laths included, . "	0 25	0 12

	Employers' prices for materials and labor.	Journeymen's prices for labor only.
BEADS, QUIRRKS, &c. PLAIN.		
Cutting quirks to wood heads, . per foot run	0 02	0 01
Ditto circular, ... "	0 02½	0 01½
Plaster bead and quirk, ... "	0 04½	0 03
Ditto and double quirk, . . . "	0 06	0 04
Ditto circular, ... "	0 08	0 06
" on a circular or elliptical plan, "	0 10	0 08
FRIEZES AND SOFFITS, PLAIN.		
Floated frieze on laths, set with stucco, per foot super.	0 05	0 02
Ditto soffits, ... "	0 05½	0 03
Ditto circular, ... "	0 09	0 06
Ditto elliptical, ... "	0 12	0 08
Circular soffits, 3 panels, bead and flesh, on lath work. per foot super,	0 25	0 16
Ditto 3 sunk panels, with ogee moulding "	0 37½	0 25
CORNICES OR MOULDINGS, PLAIN.		
Compounded mouldings, up to 3 inches girt, per ft. run	0 06	0 03
Ditto " 4 inches girt, "	0 07½	0 04
Ditto " 5 inches girt, "	0 08½	0 05
Ditto " 6 inches girt, "	0 09	0 06
Ditto " 7 inches girt, "	0 11	0 07
Ditto " 8 inches girt, "	0 12	0 08
Ditto " 9 inches girt, "	0 13	0 09
All above 9 inches girt, . . per foot super.	0 14	0 10
N. B. The dubbing out (and laths, if bracketed,) included in the above.		
ENRICHMENTS TO CORNICES.		
Enriched mouldings, cast solid up to 1 inch girt, and fixed, ... per foot run.	0 06	0 03
Ditto " " 1½ inches girt "	0 07	0 03¼
Ditto " " 2 inches girt "	0 08	0 04
Ditto " " 2½ inches girt "	0 10	0 05
Ditto " " 3 inches girt "	0 12	0 06
Ditto " " 3½ inches girt "	0 14	0 07
Ditto " " 4 inches girt "	0 16	0 08
Ditto " " 5 inches girt, "	0 20	0 09
Ditto " " " " back moulded, "	0 25	0 10
Ditto " " 6 inches girt, "	0 24	0 10
Ditto " " " " back moulded, "	0 27	0 12

ENRICHMENTS TO SOFFITS

IN CORNICES OR CEILINGS, CAST & PUT UP.

		Employers' prices for materials and labor.		Journeymen's prices for labor only.	
Guilochi or gollos,	1½ inches wide, per foot run.	0	07	0	04
Ditto and flower,	2 inches wide, "	0	08	0	05
Ditto "	3 inches wide, "	0	12	0	06
Ditto "	4 inches wide, "	0	16	0	06½
Ditto "	6 inches wide, "	0	23	0	08
Ditto "	8 inches wide, "	0	30	0	10
Ditto "	" " with rosetts cast and laid on, "	0	36	0	12

Frets, flutings, or any other ornaments, of the above widths, are about the same prices.

ENRICHMENTS TO FRIEZES

AND STRINGS, CAST AND PUT UP.

Friezes,	4 inches wide, . . . per foot run.	0	12	0	06
Ditto	5 inches wide, . . . "	0	15	0	07
Ditto	6 inches wide, . . . "	0	19	0	08
Ditto	7 inches wide, . . . "	0	23	0	09
Ditto	8 inches wide, . . . "	0	27	0	10
Ditto	9 inches wide, . . . "	0	31	0	11
	all above 9 inches wide, per foot super.	0	37½	0	12
For modelling, 1 foot long, of enriched moulding common size,		7	00	6	50

LIME AND SAND CEMENT FOR OUTSIDE WORK.

The best methods of preparing calcareous cements, have been investigated by Dr Higgins, with great ability. He has advanced the most satisfactory proofs, founded upon analysis, that the Romans, whose mortar or cement, after a lapse of two thousand years, instead of being decayed, has become as hard as the stones it binds together, possessed no uncommon secret, which we are unable to discover. Sharp sand, free from clay, salts, calcareous, gypseous, or other grains less hard and durable than quartz, is better than any other. When a coarse and fine sand, corresponding in the size of their grains to the coarse and fine sand hereafter described, cannot be easily obtained in its native state, the following method of sorting and cleansing it must be resorted to.

Let the sand be sifted in streaming clear water, through a sieve which will allow all grains, not exceeding one sixteenth of an inch, to pass through, and let the stream of water be so regulated as to wash away the very fine parts of the sand, the clay, and every other matter lighter than sand. The coarse

rubbish left on the sieve must be rejected. The sand which subsides in the receptacle must then be further cleansed and sorted into two parcels, by the use of a sieve, which allows no grains to pass but what are less than one-thirteenth of an inch in diameter. That part which passes through the sieve, we shall call fine sand; the remaining portion, coarse sand. These separate portions, should be dried in the sun, or by a fire.

That sort of lime must be chosen, which heats the most in slacking, and slacks the quickest when duly watered; which is the freshest made, and has been the closest kept.

Put fourteen pounds of the lime chosen according to these important rules into a brass wire sieve, still finer than the last mentioned. Slack the lime, by alternately plunging it into, and raising it out of a butt of soft water; reject all the matter which does not pass easily through the sieve and use fresh portions of lime in a similar manner, until as many ounces of lime have passed through the sieve as there are quarts of water in a butt. This is the lime water that contributes so materially to the excellence of the stucco. As soon as a sufficient portion of lime has been imparted to it, it should be closely covered, until it becomes clear, and then drawn off by plug holes placed at different heights, as the lime subsides, without breaking the crust formed on the surface. The more free the water is from saline matter, the better will this liquor be. Lime water must be kept in air-tight vessels till the moment it is used.

Slack 58 pounds of lime, chosen as above directed, by gradually sprinkling on it the lime water. Sift the slacked part of the lime immediately through the last mentioned fine brass wire sieve; the lime which passes must be used instantly, or kept in air-tight vessels, and the rest rejected. This finer, richer part of the lime, may be called purified lime.

The materials of the cement being thus prepared, take 56 pounds of the coarse sand, and 42 pounds of the fine sand; mix and place them on a clean mortar board, to the height of six inches, with a flat surface, wet with the lime water, and allow all that the sand in this condition cannot retain, to flow off the board.

To the wetted sand, add 14 pounds of the purified lime, in several successive portions, mixing and beating them well together. Then add 12 pounds of bone ashes in successive portions, mixing and beating all together, and the sooner the cement thus formed is used, the better it will be. As this cement is shorter than mortar or common stucco, and dries sooner, it ought to be worked expeditiously, in all cases. The materials used along with it in building, or the ground on which it is laid in stuccoing, should be well wetted with lime water at the instant of laying it on; and when the cement requires moistening, lime water should always be used.

The proportions above given, are intended for a cement suited to exposed situations, where it is necessary to guard against the effects of hot weather, or rain. In general, half the quantity of bone ashes will be sufficient; and although the cement in this latter case will not harden deeply so soon, it will be ultimately stronger, provided the weather be favorable.

This cement should never be applied to walls before they have become perfectly dry, otherwise the damps or gases, that should escape by exposure to the atmosphere, are held in the wall or on the surface behind the cement which, being converted by frost into ice, separates the cement from the wall; but if prepared and applied as above directed, it may be used for all outside purposes on brick or stone work, or upon lathwood, having first a strong prick up coat of lime and hair, without any danger of its cracking,

or of being injured by frost. When the work is required to be frescoed, or colored, to imitate stone, it should be done in the following manner. Take of the lime water before described, and add 5 ounces of copperas to every gallon, with as much of the powdered lime as will make a thin whitewash: this may be tinted of any desired color, by adding ochre, umbre, blue black, red lead, or other color, to give the desired tint, and applied to the cement, as soon as it is laid on. The expense of plain face of this cement on brick work in will be as under.

		$ cts.
1 cwt of bone ashes,		2 00
5 casks of best Thomaston lime,	at $ 1 50 per cask,	7 50
6 loads of sand, (108 bushels,)	25	1 50
2 laborers, 2 days each, slacking, sifting, and securing the lime in casks, making the lime water, washing, sifting, and sorting the sand	1 00	4 00
Plasterer 3 days laying on the cement,	1 50	4 50
Laborer 3 days preparing and carrying the stuff,	1 00	3 00
		22 50
20 per cent profit,		4 50
		27 00

This will produce 60 yards of plain work on brick or stone walls, at 45 cents per yard.

OUTSIDE WORK,

DONE WITH THE PRECEDING CEMENT.

	Employers' prices for materials and labor.	Journeymen's prices for labor only.
Stucco, 2 coats, of best lime and washed sand, on brick, or stonework, jointed and frescoed, to imitate stone; in the best manner, per yard super.	0 45	0 25
Ditto on lathwork, laths, &c. included "	0 67	0 32½
if circular on brick, add "	0 12	0 10
if " on lath, add "	0 18	0 12½
Fascia, and pilasters, . . . per foot super.	0 06	0 04
Plain moulding, ... "	0 18	0 12
Arris, or sinkings, ... per foot run.	0 03	0 02
Fresco coloring, done in best manner, per yard super.	0 06	0 03

COLORING IN DISTEMPER.

Whiting, in distemper, once, ... per yard,	0 03
Ditto twice, clear coaled, and white . . "	0 06
Ditto plain cornices, ... per foot super.	0 01½
Ditto to enriched do., each enrichment, . per foot run.	0 02
Ditto, 2 coats, fawn, French gray lilac, &c. . per yard,	0 06
Ditto, blue, green, or other expensive colors, . "	0 12

PLASTERERS' PRICES

TO BE CHARGED IN DAY WORK.

Plasterer, per day,	$ 1	75
Laborer, "	1	00
Laths, per hundred,	0	25
Nails, per pound	0	10
Coarse stuff, (lime and hair,) per hod,	0	18
Fine stuff, or putty, "	0	50
Plaster, per bushel,	0	75
Roman cement, per cask,	7	00
Lime, "	1	50
Sand, per load,	0	50
Whiting, per pound,	0	07
Cartage, per load,	0	37½

For colors and other articles, not herein inserted, 20 per cent to be added to the prime cost.

OF OIL MASTIC.

This excellent cement, which has, in Europe, been used in all situations, with great success, is deserving of a trial in this country. It can be applied to brickwork, or to lathwork, having one strong coat of lime and hair; but, in all cases, the ground, whether of plaster or of brickwork, should be perfectly dry before the cement is applied. It is made up with linseed oil, in the proportion of about 4 quarts of oil to one hundred weight of mastic.

The surface of the wall, or plaster, should be well saturated with a coat of linseed oil, applied with a brush, the day previous to laying on the mastic. In working it, a board, with a strip of leather nailed along the edge, to lay closely against the wall, should be placed to catch the mastic, as it drops off on being applied: for it is so short grained, that it requires considerable practice to lay it on with facility; it is pressed on the wall with the hand or with a trowel, and floated over with a handfloat made of beech, or other close grained wood that will take a good polish. When applied to large surfaces, strips or screeds of wood should be fixed to float from; and when the plain surface is formed, it is finished with the handfloat. When properly executed it makes the best surfaces for painting on; and from its hardness, it is not so liable to injury as common plastering. In moulded work, the running mould requires to be made three fourths of an inch thick on the face, lined with copper, bent and fixed with screws into all the members, which must taper on one side, so that in working the mould can be run only in one direction, instead of being moved backward and forward as on common plaster cornices.

The expense of plain face of this cement, will be as follows:

	$	cts.
6 cwt. of mastic,	6	00
6 gallons of linseed oil,	6	00
Plasterer, 1 day,	1	50
Laborer, ½ day,	0	50
	14	00
20 per cent profit,	2	80
	$16	80

This will produce 20 yards of plain work, ⅞ of an inch thick, at 84 cents per yard.

PRICES OF WORK IN MASTIC.

	Materials and labor.		Labor only.	
	$	cts.	$	cts.
Plain face on brickwork, per yard super.	0	84	0	20
Ditto circular on plan, "	1	12½	0	30
Plain face on lathwork, with one coat of lime and hair, "	1	00	0	25½
Ditto circular on plan, "	1	37½	0	37½
Plain mouldings on brickwork, with one rough coat of filling out to cornices included, per foot super.	0	30	0	20
Ditto to small mouldings, "	0	35	0	25
Plain mouldings on lath work to cornices, including one coat of lime and hair, per foot super.	0	35	0	25
Ditto to small mouldings, "	0	40	0	30
Arris, per foot run.	0	04	0	03
Reveils, margins, fascias, &c. from 6 to 9 inches wide,	0	12½	0	08
Ditto " " under 6 inches wide,	0	09	0	06

All circular work flat sweep, 1½ times the straight; if quick sweep, twice the straight.

In measuring the mouldings, take the girt from the extent of the running mould each way.

TO PREPARE MASTIC.

Take 20 measures of the best sharp sand, sifted and purified in the most careful manner, as before directed for cement; to this add one measure of finely powdered red lead, and half a measure of litharge of lead, all in a perfectly dried state; mix them completely together by passing them through a fine seive; and when required for use, to every hundred weight of the mastic, add three quarts of linseed oil, and mix all perfectly together.

CARPENTERS' WORK.

The erection of buildings, which have occasionally great weights to sustain, being often entrusted to persons but little acquainted with the principles of construction, and still less with the weight that timber will safely bear, in any required position; the following information may, to such as possess not the means of consulting higher authorities on the subject, prove particularly serviceable.

CONSTRUCTION OF FLOORS.

The timbers which support the flooring boards and ceiling of a room, are called, in carpentry, *naked flooring*. Of naked flooring, there are different kinds, but they may all be comprised in the three following, viz: single-joisted floors, double floors, and framed floors.

A single-joisted floor consists of only one series of joists, sometimes every third or fourth joist being made deeper, with the ceiling joists nailed across at right angles. This is a good method, as the ceilings stand much better than when the laths are nailed to the joists alone.

A double floor consists of three tiers of joists, that is, binding, bridging, and ceiling joists; the binding joists are the chief support of the floor, and the bridging joists are nailed upon the upper side of them; the ceiling joists are either notched to the under side, or framed between, with chased mortices; the best method is to notch them.

Framed floors differ from double floors only in having the binding joists framed into large pieces of timber, called *girders*.

Single joisting makes a much stronger floor, with the same quantity of timber, than a double or framed floor, and may be constructed with equal ease to the same extent of bearing; but the ceilings are more subject to cracks and irregularities, consequently single joisted floors of long bearing can be used only in inferior buildings.

When it is desirable to have a perfect ceiling, a double floor is used; and when the bearing is long, a framed floor becomes the most convenient. The following experiment was made on the comparative strength of framed and single joisted floors, by Professor Robison.

Two models were made 18 inches square; one consisted of single joists, the other framed with girders, binding, bridging, and ceiling joists; the single joists of the one contained the same quantity of timber with the girders alone of the other. They were placed in a wooden trunk 18 inches square within, with a strong projection on the inside for the floors to rest on, and small shot was gradually poured over. The single joisted floor broke down with 487 pounds; the framed floor, with 327 pounds. The difference would not be quite so much on a large scale, because the girders would not be so much weakened by mortices. This is not the only case where apparent strength has turned out to be real weakness; and shows how necessary it it is to distinguish those parts which really support a load, from those which only appear to do so.

OF SINGLE JOISTED FLOORS.

In order to make a strong floor, with a small quantity of timber, the joists should be thin and deep; but a certain degree of thickness is necessary, for the purpose of nailing the boards; and two inches is perhaps as thin as the joists ought to be made.

To find the depth of a Joist, the length of bearing and thickness being given.

RULE. — Divide the square of the length in feet, by the thickness in inches; and the cube root of the quotient multiplied by 2.2 for pine, or 2.3 for oak, will give the depth in inches.

The two joists which support the trimmers to fireplaces, &c., called *trimming joists*, should, as well as the trimmers, be stronger than the common joists. In general, it will be sufficient to add one-eighth of an inch to the thickness of the trimming joists, for each joist supported by the trimmer. Thus, if the thickness of the common joists be 2 inches, and a trimmer supports 4 joists, then add 4 eighths, or half an inch, that is, make the trimming joists each two and one-half inches thick.

When the bearing exceeds 10 feet, single joisting should be strutted between the joists to prevent them from turning or twisting sideways, and also to stiffen the floor; when the bearing exceeds 15 feet, two rows of struts will be necessary, and so on, adding another row of struts for each increase of 5 feet in bearing. Herringbone strutting is found to answer best, and the well fitting and nailing of these between the joists in straight rows across the whole room, is an essential part in making a good ceiling.

For common purposes, single joisting may be used to any extent for which timber can be got deep enough; but where it is desirable to have a perfect ceiling, the bearing should not exceed 18 feet.

OF FRAMED FLOORS.

The girders are the chief support of a framed floor, and their depth is often limited by the size of the timber; therefore, the method of finding the joist may be divided into two cases.

CASE 1. — To find the depth of a girder, when the length of bearing and thickness of the girder are given.

RULE. — Divide the square of the length in feet, by the thickness in inches; and the cube root of the quotient multiplied by 4.2 for pine, or by 4.34 for oak, will give the depth required in inches.

CASE 2. — To find the thickness when the length of bearing and depth are given.

RULE. — Divide the square of the length in feet, by the cube of the depth in inches, and the quotient multiplied by 74 for pine, or by 82 for oak, will give the depth in inches.

In these rules the girders are supposed to be 10 feet apart, and this distance should never be exceeded; but should the distance apart be more or less than 10 feet, the thickness of the girder should be made proportionate thereto.

Girders should always, for long bearings, be made as deep as they can be

got; an inch or two taken from the height of a room, is of little consequence compared with a ceiling disfigured with cracks; besides the inconvenience of not being able to move in the rooms above, without shaking everything in them.

When the breadth of a girder is considerable, it is often sawn down the middle and bolted together, with the sawn sides outwards. This is an excellent method, as it not only gives an opportunity of examining the centre of the log, which from large trees is often in a state of decay; but also reduces the timber to a smaller joist, by which means it dries sooner, and is less liable to rot. The slips put between the halves, or flitches, should be thick enough to allow the air to circulate freely between them. It is generally imagined that it strengthens a girder to cut it down, reverse it, and bolt it together again; it is, in fact, weakened by the operation; but the method is here recommended, for the reasons above stated. We find that Vitruvius, the oldest author on architecture extant, directs a space of two fingers' breadth to be left between the beams for forming the architrave over columns, in order that the air may circulate between, and prevent decay.

Every one must have observed that decay begins in the first place at the joints, and other parts where the pieces are neither perfectly close, nor yet sufficiently open to allow any dampness to evaporate.

When the bearing exceeds 25 feet, it is difficult to obtain timber large enough for girders, and it is usual, in such cases, to truss them. The methods adopted for that purpose have generally the appearance of much ingenuity; but, in reality, they are of very little use. If a girder be trussed with oak, or other hard wood, all the strength that can possibly be gained by such a truss, consists merely in the difference between the compressibility of these materials and of pine, which is very small indeed; and unless the truss be extremely well fitted at the abutments, it would be much stronger without trussing. All the apparent stiffness obtained by trussing a beam, is produced by forcing the abutments, or, in other words, by cambering the beam. This forcing cripples and injures the natural elasticity of the timber, and the continual spring from the motion of the floor, upon parts already crippled, it may easily be conceived, will so far destroy them, as to render the truss an useless burden upon the beam. This fact has been long known to scientific builders, which has caused them to seek for a remedy in iron trusses; but this method is as bad as the former, unless there be an iron tie as an abutment to the truss, for the failure of a truss is occasioned by the great compression, or force, exerted upon a small surface of the timber at the abutments.

Though the usual mode of trussing girders cannot be relied on, nor, indeed any other timber truss that can be made within the depth of the beam; yet by adding to the depth, there are several methods that may be applied with success in extending the bearing of timber girders; but where the depth is limited, and the bearing considerable, iron must be employed, and the best mode of doing this would be to make the girders of cast iron, each in one piece, if the bearing should not be too long for a casting, and in two pieces when that is the case. These cast iron girders are simple, and cheaper than any kind of iron framing of the same strength, that is, when they are properly contrived, so as to make the most of the material; but it often happens that large foundries are not near, and consequently iron girders would be very expensive; at any rate, it is not proper to omit showing how they may be done without, where there is the means of increasing the depth of the floor, which may generally be done without inconvenience.

The principle of constructing girders of any depth is the same as that of building beams, and, when properly conducted, is as strong as any truss

that can be made of the same depth. A very good method consists in bending a piece of timber about half the depth of the lower beam into a curve, by inserting a piece cut into the curved form like a centre between the two, and securing the upper piece from springing back by means of strong flat iron hoops, which may be driven on from the ends until they become perfectly tight. The pieces should be well bolted together at the ends, to prevent any sliding of the parts. In this manner, a beam might be built of any depth that is necessary in the erection of buildings, and by breaking the joints of any length that is likely to be needed in the construction of floors; when built of several pieces, shorter than the bearing, the thickness of the bent pieces may be about one fifteenth part of the span, and as many of them should be added as will increase the depth to that proposed, unless the whole depth of the curved pieces exceeds half the depth of the girder; and in that case, straight pieces should be added to the underside, so as to make the whole depth of the straight parts exceed the depth of the curved parts. When pieces cannot be got sufficiently long for the girder, care should be taken to have no joints near the middle of the length in the lower half of the girder.

In the construction of floors, it would be a great advantage to make each girder only half the breadth given by the rule, and to place them only five feet apart; to bridge the upper or floor joists over the girders, to notch the ceiling joists to the under side of them, and to omit the binders. There would be a great increase of strength and stiffness by adopting this method; and, in point of economy, it is decidedly preferable, only it requires a greater depth of flooring.

As the strain is always greatest at the middle of the length of a girder, it would be well to avoid making mortices there, if possible, either for binding joists or any other purpose; and the most straight grained part of the beam should be put to the under side.

Timber girders should not be built into the wall, but an open space should be left around their ends, either by laying a flat stone over them, or by turning an arch to carry the wall above, and the girder laid from 9 to 12 inches into the wall, according to the bearing.

BINDING JOISTS.

The depth of a binding joist is generally determined by the depth of the floor, but this is not always the case. Therefore the rules must be given for two cases.

CASE 1.—To find the depth of a binding joist, the length and thickness being given.

RULE.—Divide the square of the length in feet, by the thickness; and the cube root of the quotient multiplied by 3.42 for pine, or by 3.53 for oak, will give the depth in inches.

CASE 2.—To find the thickness, when the depth and length are given.

RULE.—Divide the square of the length in feet, by the cube of the depth in inches, and multiply the quotient by 40 for pine, or by 44 for oak, which will give the thickness in inches.

These rules suppose the distance apart to be 6 feet; if the distance apart be greater or less than 6 feet, the thickness given by the rule must be increased or diminished in proportion. The thickness of the binding joists next the wall may be two-thirds of the thickness of the others, but in general they are made thesame thickness, and such as are defective are selected for that purpose.

BRIDGING JOISTS.

The rule for bridging joists is the same as that for single joisting. They seldom need be more than 2 inches in thickness, except for ground floors, where they are laid upon sleepers; in which case, the depth may be found to a thickness of 2 inches, and an inch may be added to the thickness on account of the situation; as when proper care is not taken to drain and ventilate the under side of a ground floor, the joists are subject to a very rapid decay. It is a good practice to strew smiths' ashes, or even common ashes, under such floors, to prevent the growth of fungi. The ashes and scoriæ from a foundry, or any ashes that contain much iron, are best. Mr Batson found this an effectual remedy for the dry rot. He filled a space below the floor, of 2 feet in depth, with anchor-smiths' ashes, and also charred the sleepers.

CEILING JOISTS.

Ceiling joists require to be no thicker than is necessary to nail the laths to; two inches is quite sufficient for that purpose.

To find the depth of a ceiling joist, when the length of bearing and thickness are given.

RULE.—Divide the length in feet by the cube root of the thickness in inches, and multiply the quotient by 0.64 for pine, or 0.67 for oak, which will give the depth in inches required.

If 2 inches be fixed upon for the thickness of ceiling joists, the rule for finding the depth becomes very easy: for half the length in feet gives the depth in inches; that is, if the length be 10 feet, the depth should be 5 inches; if 6 feet, the depth 3 inches; and so on for any other length.

It is better to notch ceiling joists to the under side of the binding joists, and nail them, than to mortice and chase them in; because it requires less labor, it does not weaken the binding joists, and the ceiling stands better.

GENERAL OBSERVATIONS RESPECTING FLOORS.

Girders should never be laid over openings, such as doors and windows, if it be possible to avoid it. In the bearings of floors the caution of Vitruvius must be attended to, that is, when the joists are supported by external walls of considerable height, the middle part of the joists should never rest upon a partition wall that does not go higher than the floor, otherwise, the unequal settlement of the walls will cause the floor to be unlevel, and most likely fracture the cornices.

Wall plates and templets should be made stronger as the span becomes longer. The following proportions may serve for general purposes:

For a 20 feet bearing, wall plates $4\frac{1}{2}$ by 3 inches.
" 30 " " " " 6 by 4 "
" 40 " " " " $7\frac{1}{2}$ by 5 "

Floors should always be kept higher in the middle than at the sides when first framed, as all floors, however well constructed, will settle in some degree.

To prevent the unpleasant appearance of open joints in floors, a good method would be, where the case would admit, to tack down the boards for the first year, and in the hottest season of the following year, to nail them down for good; this would cause the floor to remain perfectly close ever afterwards; but if boards be taken up, and the edges shot, they will shrink again, no matter how long they may have lain before.

OF THE CONSTRUCTION OF ROOFS.

In old Gothic buildings, the roof always had a high pitch, its outline formed a striking feature, and in general had a graceful proportion with the magnitude of the buildidg; sometimes, however, it presented a plain surface of too great extent, as the roof of Westminster Hall. Though a high roof is in perfect unison with the aspiring and pyramidal character of Gothic architecture; in the more chaste and classic style of the Greeks, it is a less conspicuous object. Many of the Grecian buildings were never intended to be roofed at all; but where a roof was necessary, it was not attempted to be hidden, but constituted one of the most ornamental parts of the building. Of timber roofs, we have no examples in Grecian buildings; but the beautiful stone roof of the Octagon Tower of Andronicus Cyrrhestes, and that of the Choragic Monument of Lysicrates, are sufficient to show that they were more inclined to ornament than to hide this essential part of a building.

The height of roofs at the present time, is seldom above one-third of the span, and should never be less than one-sixth. The most usual pitch is that when the height is one-fourth of the span, or when the angle with the horizon is 26½ degrees.

The pediments of the Greek temples make an angle of from 12 to 16 degrees with the horizon; the latter corresponds nearly with one-seventh of the span. The pediments of the Roman buildings vary from 23 to 24 degrees: 24 degrees is nearly two-ninths of the span.

The kinds of covering used for timber roofs, are copper, lead, iron, tinned iron, slates of different kinds, tiles, shingles, reeds, straw, and heath. Taking the angle of slates to be 26½ degrees, the following table will show the degree of inclination that may be given for other materials.

Kind of covering.	Inclination to the horizon in degrees.		Height of roof in parts of the span.	Weight upon a square of roofing.
	Deg.	Min.		
Copper,	8	50	$\frac{1}{12}$	100 pounds.
Lead,	3	50	$\frac{1}{48}$	700 "
Slates, large,	22	00	$\frac{1}{5}$	1120 "
Ditto, ordinary,	26	33	$\frac{1}{4}$	900 "
Ditto, fine,	26	33	$\frac{1}{4}$	500 "
Plain tiles,	29	41	$\frac{2}{7}$	1780 "
Pan tiles,	24	00	$\frac{2}{9}$	650 "
Thatch, of straw,				
Reeds or Heath,	45	00	$\frac{1}{2}$	

TABLE OF THE JOIST FOR GIRDERS, OF CLEAR WHITE PINE.

For different bearings, from 10 to 36 feet, the Girders 10 feet apart.

Length of bearing in feet.	Depth 10 in.	Depth 11 in.	Depth 12 in.	Depth 13 in.	Depth 14 in.	Depth 15 in.	Depth 16 in.	Depth 17 in.	Depth 18 in.
	thickness in inches.	thickness in inches	thickness in inches.	thickness in inches.	thickness in inches.	thickness in inches.	thickness in inches.	thickness in inches.	thickness in inches.
10	7½	5½	4	3½	2¾	2¼	1¾	1½	1¼
11	9	6¾	5	4¼	3¼	2¾	2¼	2	1¾
12	10½	8	5¾	5	3¾	3¼	2¾	2¼	2
13	12½	9½	6¾	5¾	4½	3¾	3	2½	2¼
14	14½	10¾	7¾	6¾	5¼	4½	3½	3	2½
15	16½	12½	9	7¾	6	5	4	3½	3
16	18¾	14	10¼	8¾	7	5¾	4¾	4	3¼
17	.	16	11½	9¾	8	6¼	5¼	4½	3¾
18	.	17¾	13	11	8¾	7¼	6	5	4
19	.	19¾	14½	12	9¾	8	6½	5½	4¾
20	. . . .	.	16	13½	10¾	9	7¼	6	5¼
21	. . . .	.	17½	15	12	9¾	8	6¾	5¾
22	. . . .	.	19½	16½	13	10¾	8¾	7½	6¼
23	. . . . .	. . .	.	18	14¼	11½	9½	8	6¾
24	. . . . .	. . .	.	19½	15½	12¾	10½	8¾	7½
25	. . . . .	. . .	.	.	16¾	13¾	11¼	9½	8
26	. . . . .	. . .	.	.	18¼	15	12¼	10¼	8½
27	. . . . .	. . .	.	.	19¾	16	13	11	9¼
	Depth 19 in.	Depth 20 in.	Depth 21 in.						
28				. . . .	.	17¼	14¼	11¾	10
29				. . . .	.	18½	15¼	12¾	10¾
30	thickness in inches.	thickness in inches.	thickness in inches	. . . .	.	19¾	16¼	13½	11½
31	9¾	8½	7¼	. . . . .	.	.	17¼	14½	12¼
32	10¼	9	7¾	. . . . .	.	.	18½	15½	13
33	11	9½	8¼	. . . . .	.	.	19¾	16½	14
	11¾	10	8¾						
34	12½	10¾	9½	. . . . .	.	.	.	17½	14¾
35	13¼	11½	10	. . . . .	.	.	.	18½	15¾
36	14	12	10½	. . . . .	.	.	.	19½	16½

To find the joist for a girder for any length of bearing, look in the left hand column for the bearing, and opposite in any of the other columns is the thickness, with the proper depth for that thickness, at the head of the column. Thus, for a 20 feet bearing, a girder may be 16 inches in the thickness, and 12 inches deep, or the thickness may be 13½ inches, and the depth 13 inches and so on; but where there is a space to admit of a deep girder, it requires less timber. A new series of depths begin for bearings above 29 feet.

TABLE OF JOIST FOR BINDING JOISTS OF WHITE PINE.

For different bearings, from 5 to 20 feet, when the distance from middle to middle is 6 feet.

Length of bearing in feet.	Depth 6 in.	Depth 7 in.	Depth 8 in.	Depth 9 in.	Depth 10 in.	Depth 11 in.	Depth 12 in.
	thickness in inches.	thickness in inches.	thickness in inches.	thickness in inches	thickness in inches.	thickness in inches.	thickness in inches.
5	$4\frac{3}{4}$	3	2				
6	$6\frac{3}{4}$	4	3	2			
7	. .	$5\frac{1}{2}$	4	$2\frac{3}{4}$	2		
8	. .	7	$5\frac{1}{4}$	$3\frac{3}{4}$	$2\frac{3}{4}$	2	
9	. . .	. .	$6\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2}$	
10	. . . .	. .	8	$5\frac{1}{2}$	4	3	$2\frac{1}{2}$
11	. . . . .	. .	. .	$6\frac{3}{4}$	5	$3\frac{3}{4}$	3
12	. . . . .	. .	. .	8	6	$4\frac{1}{2}$	$3\frac{1}{2}$
	Depth 13 in.	Depth 14 in.	Depth 15 in.				
13					7	$5\frac{1}{4}$	4
14				. .	8	$5\frac{3}{4}$	$4\frac{1}{2}$
15	thickness in inches	thickness in inches	thickness in inches.	. .	9	$6\frac{3}{4}$	$5\frac{1}{4}$
16				. .	$10\frac{1}{4}$	$7\frac{3}{4}$	6
	4	$3\frac{1}{2}$	$2\frac{3}{4}$				
17	$4\frac{1}{2}$	$3\frac{3}{4}$	$3\frac{1}{4}$	. . . .		$8\frac{3}{4}$	$6\frac{3}{4}$
18	$5\frac{1}{4}$	$4\frac{1}{4}$	$3\frac{1}{2}$	. . . .		$10\frac{1}{2}$	$7\frac{1}{2}$
	$5\frac{3}{4}$	$4\frac{3}{4}$	4				
19	$6\frac{1}{2}$	$5\frac{1}{2}$	$4\frac{1}{4}$	. . . . .			$8\frac{1}{2}$
20	$7\frac{1}{4}$	6	$4\frac{3}{4}$	. . . . .			$9\frac{1}{2}$

To find the scantling for a binding joist for any bearing, look in the left hand column for the bearing in feet, opposite the length of the bearing, and under some one of the depths at the head of the columns will be found the thickness required. Thus, if it be required to find the scantling for a binding joist, for a 10 feet bearing, and 9 inches is a depth that would be suited to the floor; then opposite 10 feet on the left hand column; and under 9 inches, at the head of one of the middle columns, we find $5\frac{1}{2}$ inches, which is the thickness required. If 8 inches had been fixed upon for the depth, it would have required 8 inches in thickness to be equally as stiff as one of 9 by $5\frac{1}{2}$. If the bearing be 19 feet, and 13 inches, a convenient depth; then opposite 19 in the left hand column, and under the depth 13 inches, we find $6\frac{1}{2}$ inches to be the proper thickness.

TABLE OF THE JOISTS FOR SINGLE JOISTING, OR BRIDGING JOISTS, OF WHITE PINE.

For different bearings, from 5 to 25 feet, the distance from centre to centre being 12 inches.

Length of bearing in feet.	Thickness 2½ in.	Thickness 1¾ in.	Thickness 2 in.	Thickness 2¼ in.	Thickness 2½ in.	Thickness 2¾ in.	Thickness 3 in.	Thickness 3¼ in.	Thickness 3½ in	Thickness 4 in.
	Depth in in.	Depth in in.	Depth in in.	Depth in in.	Depth in in.	Depth in in.	Depth in in.	Depth in in.	Depth in in.	Depth in in.
5	5¾	5½	5¼	5	4¾	4½	4⅜	4¼	4⅛	4
6	6¼	6	5¾	5½	5⅜	5¼	5	4⅞	4¾	4½
7	7	6¾	6½	6¼	6	5¾	5½	5⅜	5¼	5
8	7¾	7½	7	6¾	6½	6⅜	6¼	6	5⅞	5¾
9	8½	7⅞	7½	7	6⅞	6¾	6½	6¼	6	5⅞
10	9	8½	8	7¾	7½	7¼	7	6⅞	6¾	6½
11	9½	9	8¾	8½	8	7⅞	7½	7¼	7	6¾
12	10	9¾	9½	9	8½	8¼	8	7⅞	7½	7¼
13	10¾	10¼	9¾	9½	9	8¾	8½	8¼	8	7¾
14	11	10½	10	9¾	9½	9¼	9	8¾	8½	8
15	11½	11	10½	10	9¾	9½	9¼	9	8¾	8½
16	12¼	11½	11	10¾	10½	10	9¾	9½	9¼	8⅞
17	12¾	12	11½	11¼	10¾	10½	10¼	10	9¾	9¼
18	13¼	12½	12	11½	11¼	10¾	10½	10¼	10	9½
19	13¾	13	12½	12	11½	11¼	10¾	10½	10¼	10
20	14¼	13½	13	12½	12	11½	11¼	11	10¾	10¼
21	14¾	14	13½	12¾	12½	12	11¾	11½	11	10¾
22	15	14½	13¾	13¼	12¾	12½	12	11¾	11½	11
23	15½	14¾	14	13½	13	12¾	12¼	12	11¾	11¼
24	16	15¼	14½	14	13½	13¼	12¾	12½	12	11¾
25	16½	15½	15	14½	14	13½	13	12¾	12½	12

To find the scantling of a joist for any bearing, look in the left hand column for the given bearing, and opposite in any of the other columns will be found the depth, with the corresponding thickness at the head of the column; therefore, such a thickness may be taken as is best adapted to the purpose required. Thus, for a 14 feet bearing, a joist 10 by 2 is of the same degree of stiffness as one of 9 by 3, or as one of any other depth opposite 14, with the thickness at the top of the column.

TABLE OF THE SCANTLINGS FOR CEILING JOISTS OF WHITE PINE.

For different bearings, from 4 to 16 feet, the distance from centre to centre being 12 inches.

Length of bearings in feet.	Thickness 1¼ inches.	Thickness 1⅜ inches.	Thickness 2 inches.	Thickness 2½ inches	Thickness 2½ inches.	Thickness 2⅝ inches.	Thickness 3 inches.
	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.
4	2¼	2⅛	2				
5	2¾	2⅝	2½				
6	3⅜	3¼	3	2⅞			
7	4	3¾	3½	3⅜	3¼		
8	4½	4¼	4	3⅞	3¾	3⅝	3½
9	5	4¾	4½	4⅜	4¼	4⅛	4
10	5¾	5⅜	5	4⅞	4¾	4⅝	4½
11	6¼	5⅞	5½	5⅜	5¼	5⅛	5
12	6¾	6½	6	5⅞	5¾	5⅝	5¼
13	7½	7	6½	6¼	6	5⅞	5¾
14	8	7½	7	6¾	6½	6⅜	6¼
15	8½	7⅞	7½	7⅜	7¼	7	6¾
16	9	8¼	8⅜	7⅞	7¾	7⅝	7½

In order to find the scantling of a ceiling joist for any bearing, look for the length of the bearing, in the left hand column, and opposite will be found the depth, with the thickness at the top of the column, containing the depth that is most convenient. Ceiling joists should never have very long bearings, particularly those for ceilings next the roof of a house, as long joists are subject to warp and break the plastering.

The distance from centre to centre should never exceed 16 inches, otherwise the bearing for the laths become too long to produce sound work.

TABLE OF JOIST OF TIMBER FOR ROOFS,

Of different spans, from 20 to 30 feet. The pitch of the roof about 26½ degrees; the covering slate; the timber good white pine, and the principals not more than 10 feet apart.

Span.	Tie beam.	King post.	Principal rafters.	Braces.	Purlins.	Small rafters.
Feet.	Inches.	Inches.	Inches.	Inches	Inches	Inches.
20	9½×4	4×4	4×3	3½×2	8 ×4¾	3½×2
22	9½×5	5×3	5×3	3¾×2¼	8¼×5	3¾×2
24	10½×5	5×3½	5×3½	4 ×2½	8½×5	4 ×2
26	11½×5	5×4	5×4¼	4¼×2½	8¾×5	4¼×2
28	11½×6	6×4	6×3½	4½×2¾	8¾×5¼	4½×2
30	12½×6	6×4½	6×4	4¾×3	9 ×5½	4¾×2

TABLE OF JOIST FOR ROOFS,

Of from 30 to 46 feet span; the trusses 10 feet apart; pitch of roof $26\frac{1}{2}$ degrees; covering slate; and timber best white pine.

Span.	Tie beam.	Queen posts.	Principal rafters.	Straining beam.	Braces.	Purlins.	Small rafters.
Feet.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
32	10 × $4\frac{1}{2}$	$4\frac{1}{2}$ × 4	5 × $4\frac{1}{2}$	$6\frac{3}{4}$ × $4\frac{1}{2}$	$3\frac{3}{4}$ × $2\frac{1}{4}$	8 × $4\frac{3}{4}$	$3\frac{1}{2}$ × 2
34	10 × 5	5 × $3\frac{1}{2}$	5 × 5	$6\frac{3}{4}$ × 5	4 × $2\frac{1}{2}$	$8\frac{1}{4}$ × 5	$3\frac{3}{4}$ × 2
36	$10\frac{1}{2}$ × 5	5 × 4	5 × $5\frac{1}{4}$	7 × 5	$4\frac{1}{4}$ × $2\frac{1}{2}$	$8\frac{1}{2}$ × 5	4 × 2
38	10 × 6	6 × $3\frac{3}{4}$	6 × 6	$7\frac{1}{4}$ × 6	$4\frac{1}{2}$ × $2\frac{1}{2}$	$8\frac{1}{2}$ × 5	4 × 2
40	11 × 6	6 × 4	6 × 6	8 × 6	$4\frac{1}{2}$ × $2\frac{1}{2}$	$8\frac{3}{4}$ × 5	$4\frac{1}{4}$ × 2
42	$11\frac{1}{2}$ × 6	6 × $4\frac{1}{2}$	$6\frac{1}{4}$ × 6	$8\frac{1}{4}$ × 6	$4\frac{1}{2}$ × $2\frac{3}{4}$	$8\frac{3}{4}$ × $5\frac{1}{4}$	$4\frac{1}{2}$ × 2
44	12 × 6	6 × 5	$6\frac{1}{2}$ × 6	$8\frac{1}{4}$ × 6	$4\frac{3}{4}$ × 3	9 × 5	$4\frac{3}{4}$ × 2
46	$12\frac{1}{2}$ × 6	6 × $5\frac{1}{2}$	7 × 6	9 × 6	$4\frac{3}{4}$ × 3	9 × $5\frac{1}{2}$	5 × 2

These tables are calculated for the smallest joists that ought to be used which must be of the best clear pine; if the timber be inferior, the joist, should of course be stouter.

TABLE OF JOIST FOR ROOFS,

Of from 46 to 60 feet span; the trusses 10 feet apart.

Span.	Tie beam.	Queen posts.	Posts.	Principal rafters.	Straining beam.	Braces.	Purlins.	Small rafters.
Inch.	Inches	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
48	$11\frac{1}{2}$ × 6	6 × $5\frac{3}{4}$	6 × $2\frac{1}{4}$	$7\frac{1}{2}$ × 6	$8\frac{1}{4}$ × 6	$4\frac{1}{2}$ × $2\frac{3}{4}$	$8\frac{1}{2}$ × 5	4 × 2
50	12 × 6	6 × $6\frac{1}{4}$	6 × $2\frac{1}{2}$	$8\frac{1}{2}$ × 6	$8\frac{1}{2}$ × 6	$4\frac{1}{2}$ × $2\frac{3}{4}$	$8\frac{3}{4}$ × 5	$4\frac{1}{4}$ × 2
52	12 × $6\frac{1}{2}$	6 × $6\frac{3}{4}$	6 × $2\frac{3}{4}$	$9\frac{1}{4}$ × 6	$8\frac{3}{4}$ × 6	$4\frac{3}{4}$ × $2\frac{3}{4}$	$8\frac{3}{4}$ × $5\frac{1}{4}$	$4\frac{1}{4}$ × 2
54	12 × 7	7 × $6\frac{1}{4}$	7 × $2\frac{1}{4}$	$6\frac{1}{2}$ × 7	9 × 6	$4\frac{3}{4}$ × $2\frac{3}{4}$	$8\frac{3}{4}$ × $5\frac{1}{4}$	$4\frac{1}{2}$ × 2
56	12 × 8	7 × $6\frac{3}{4}$	7 × $2\frac{1}{2}$	$7\frac{1}{2}$ × 7	$9\frac{1}{4}$ × 6	5 × $2\frac{3}{4}$	$8\frac{3}{4}$ × $5\frac{1}{4}$	$4\frac{1}{2}$ × 2
58	12 × $8\frac{1}{2}$	7 × $7\frac{1}{4}$	7 × $2\frac{3}{4}$	$8\frac{1}{4}$ × 7	$9\frac{1}{2}$ × 7	5 × $2\frac{3}{4}$	9 × $5\frac{1}{4}$	$4\frac{3}{4}$ × 2
60	12 × 9	$7\frac{1}{2}$ × 7	7 × 3	9 × 7	10 × 7	5 × 3	9 × $5\frac{1}{2}$	$4\frac{3}{4}$ × 2

TABLE OF JOISTS FOR ROOFS,

Of from 60 to 90 feet span, the trusses 10 feet apart.

Span.	Tie beam.	Queen posts.	Posts.	Principal rafters.	Straining beam.	King posts.	Braces.	Purlins.	Small rafters.
feet.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
65	15×10½	8 ×7	5×3	8 × 7½	10½× 8	5×3	5×3¼	8½×5	4 ×2
70	15×11¾	9 ×6½	5×3½	9 × 7	10½× 9	5×3½	5×3½	8½×5	4¼×2
75	15×13¾	9 ×7½	5×4	9 × 8	11¼× 9	5×4	5×4½	8¾×5	4½×2
80	16×13	9 ×9	6×4	10½× 9	12 × 9	6×4	6×3½	8¾×5	4½×2
85	16×13½	9½×9	6×4½	12½× 9	12¾× 9	6×4½	6×4	9 ×5¼	4¾×2
90	16×14	10 ×9¾	6×4½	10 ×10	13 ×10	6×4½	6×4	9 ×5½	5 ×2

In these tables the pitch of the roof is supposed to be about 26½ degrees the covering slate, and the timber best white pine. Inferior timber will require to be of larger dimensions, but the addition of one-fourth of an inch to each dimension will be sufficient for any difference in quality, except it be knotty timber.

TABLE OF THE SCANTLINGS OF BINDING JOISTS, OF BEST WHITE PINE,

That have to carry a ceiling only, for different bearings, from 5 to 12 feet; the distance apart being not more than 6 feet.

Length of bearing in feet.	Thickness 2 inches.	Thickness 2½ inches.	Thickness 3 inches.	Thickness 3½ inches.	Thickness 4 inches.	Thickness 4½ inches.	Thickness, 5 inches.	Thickness 5½ inches.
	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.
5	4¾	4½	4¼	4	3¾	3½		
6	5¾	5½	5	4¾	4½	4½		
7	6¾	6¼	6	5¾	5¼	5		
8	7¾	7¼	6¾	6½	6	5¾		
9	8¾	8	7½	7¼	6¾	6½	6¼	
10	9¾	8½	8¼	8	7½	7¼	7	6¾
11	10½	9¾	9¼	8¾	8¼	8	7¾	7½
12	11½	10¾	10	9½	9¼	8¾	8½	8¼

TABLE OF THE JOISTS OF PURLINS OF BEST WHITE PINE,

For different bearings, of from 6 to 14 feet, the distances apart being 6, 7, 8 and 9 feet.

Length of bearing.	6 feet apart.		7 feet apart.		8 feet apart.		9 feet apart.	
	Depth in inches.	Thickness in inches.	Depth in inches.	Thickness in inches.	Depth in inches.	Thickness in inches	Depth in inches.	Thickness in inches.
6	6	3½	6¼	3¾	6½	4	6¾	4¼
7	6¾	4	7	4¼	7¼	4½	7½	4½
8	7½	4½	7¾	4¾	8	4¾	8¼	5
9	8¼	5	8½	5¼	8¾	5¼	9	5½
10	8¾	5¾	9¼	5½	9½	5¾	9¾	5¾
11	9½	5¼	9¾	5¾	10¼	6	10¼	6¼
12	10	6	10½	6¼	10¾	6½	11½	6¾
13	10¾	6½	11¼	6¾	11½	7	12	7¼
14	11¼	6¾	11¾	7	12¼	7¼	12½	7½

Purlins may often be found apparently strong enough of less joists than these, but in such cases the common rafters will be found to be stronger than necessary. But it is most economical to make the rafters no stronger than is requisite to carry the load between the purlins, and the purlins sufficiently strong to carry the rafters.

TABLE OF THE JOISTS OF COMMON RAFTERS,

For roofs of different bearings, from five feet to twenty feet; the distance apart being twelve inches.

Length of bearing in feet.	Thickness, 1¾ in.	Thickness, 2 in.	Thickness, 2¼ in.	Thickness, 2½ in.	Thickness, 2¾ in	Thickness, 3 in.	Thickness, 3¼ in.	Thickness, 4 in.	Thickness, 4¼ in.
	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches	Depth in inches	Depth in inches.	Depth in inches.	Depth in inches.
5	3	2⅞							
6	3¼	3½	3¼	3⅜					3
7	4⅛	4	3¾	3⅝					3½
8	4¾	4⅝	4⅜	4¼	4	3¾			4⅛
9	5¼	5⅜	5	4¾	4½	4¼			4⅝
10	6	5¾	5½	5⅜	5	4¾	4½		5⅛
11	6½	6¼	6	5¾	5½	5¼	5	4¾	5⅝
12	7	6¾	6½	6⅜	6	5¾	5½	5¼	6¼
13	7¾	7½	7¼	7	6½	6¼	5¾	5⅝	6¾
14	8¼	8	7¾	7½	7	6¾	6¼	6⅛	7¼
15	8¾	8½	8¼	8	7½	7¼	6¾	6⅝	7¾
16	9½	9¼	8¾	8½	8	7¾	7¼	7	8¼
17	10	9¾	9½	9	8½	8¼	8	7½	8¾
18	10½	10¼	10	9½	9	8¾	8½	8	9¼
19	11	10⅞	10½	10	9½	9	8¾	8¼	9¾
20	11½	11½	11	10½	10	9½	9	8¾	10¼

Roofs that are covered with plain tiles, will require rafters, one-third stronger than is necessary for the blue slate. The table will answer for either, for it is calculated for blue slate; and if to the thickness found at the head of a colnmn, half of that thickness be added, it will give the thickness required for plain tiles; and one-third the thickness added, will give the thickness for pantiles. Purlins will also require the same addition to their thickness when the covering is of tiles instead of slates.

OF POSTS.

According to the experiments of Rondelet, when the height of a square post is less than about 7 or 8 times the side of its base, it cannot be bent by any pressure less than that which would crush it. The internal mechanism of the resisting forces, when timber yields by crushing, is not exactly understood. In timber the resistance to crushing is less than the the cohesive force. The resistance of timber to crushing appears to increase in a higher ratio than that of the area of its section. According to the experiments of Rennie, made on cubes of one inch in length, it required the following weights to crush them:

A cubical inch of Elm,	1284 pounds.
American Pine,	1606
White Deal,	1928
English Oak,	3860

The load a piece of timber will bear, when pressed in the direction of its length, without risk of being crushed, may be found by the following rule:

Multiply the area of the piece of timber, in inches, by the weight that is capable of crushing a square inch of the same kind of wood, then, one-fourth of the product will give the load in pounds that the piece would bear with safety.

If the area that would support a given weight be required, divide 4 times the weight by the number of pounds that would crush a square inch, and the quotient is the area in inches.

The length should never exceed 10 times the side of the section to give the above results; for when the length is greater than about 10 times the thickness, the piece will bend before it crushes.

TABLE OF JOISTS FOR STORY POSTS, TO CARRY TWO STORIES.

Height in feet.	4 feet apart.	5 feet apart.	6 feet apart.	7 feet apart.	8 feet apart.
	Width, thkness, inches.	Width, thkness, inches.	Width, thkness, inches.	Width, thkness, inches.	Width, thkness, inches.
6	7½ by 4½	7⅜ by 4⅝	8¼ by 5	8⅜ by 5¼	9¼ by 5½
7	7¾ " 4¾	8⅜ " 5¼	9¼ " 5½	9½ " 5¾	9½ " 5¾
8	8¾ " 5¼	9¼ " 5½	9½ " 5¾	10 " 6	10½ " 6¼
9	9¼ " 5½	9½ " 5¾	10½ " 6¼	10¾ " 6½	10¾ " 6¾
10	9½ " 5¾	10½ " 6¼	10¾ " 6½	11¼ " 6¾	10¾ " 7
11	10¼ " 6¼	10¾ " 6½	11½ " 6¾	11¾ " 7	12 " 7¼
12	10¾ " 6¼	11¼ " 6¾	11¾ " 7	12¼ " 7½	12¾ " 7¾
13	11¼ " 6¾	11¾ " 7	12½ " 7½	12¾ " 7¾	13¼ " 8
14	11¾ " 7	12 " 7¼	12¾ " 7¾	13¼ " 8	13¾ " 8¼
15	12 " 7¼	12½ " 7½	13¼ " 8	13¾ " 8¼	14¼ " 8½
16	12½ " 7½	12¾ " 7¾	13¾ " 8¼	14¼ " 8½	14½ " 8¾

TABLE OF JOISTS FOR STORY POSTS, TO CARRY THREE STORIES.

Height in feet.	4 feet apart.	5 feet apart.	6 feet apart.	7 feet apart.	8 feet apart.
	Width, thkness, inches.	Width, thkness, inches.	Width, thkness, inches.	Width, thkness, inches.	Width, thkness, inches.
8	9½ by 5¾	10 by 6	10⅜ by 6½	11¼ by 6¾	11⅜ by 7
9	10 " 6	10¾ " 6½	11¼ " 6¾	11¾ " 7	12 " 7¼
10	10½ " 6¼	11¼ " 6¾	12 " 7	12¼ " 7¼	12½ " 7¾
11	11¼ " 6¾	11½ " 7	12½ " 7½	12¾ " 7¾	13¼ " 8
12	11¾ " 7	12½ " 7½	13 " 7¾	13¼ " 8	14 " 8¼
13	12 " 7¼	12¾ " 7¾	13¾ " 8¼	14 " 8½	14½ " 8¾
14	12¾ " 7¾	13¼ " 8	14¼ " 8½	14½ " 8¾	15 " 9
15	13¼ " 8	14¼ " 8½	14½ " 8¾	15 " 9	15¾ " 9¼
16	13¾ " 8¼	14½ " 8¾	15 " 9	15½ " 9¼	16¼ " 9¾

The walls to be supported are supposed to be of brick, built of the usual thickness.

TABLE OF JOISTS FOR STORY POSTS TO CARRY FOUR STORIES.

Height in feet.	4 feet apart.	5 feet apart.	6 feet apart.	7 feet apart.	8 feet apart.
	Width, thkness, inches.	Width, thkness, inches.	Width, thkness, inches.	Width, thkness, inches.	Width, thkness, inches.
8	$10\frac{1}{4}\times6\frac{1}{4}$	$10\frac{3}{4}\times6\frac{1}{2}$	$11\frac{1}{4}\times6\frac{3}{4}$	12×7	$12\frac{1}{4}\times7\frac{1}{4}$
9	$10\frac{3}{4}\times6\frac{1}{2}$	$11\frac{3}{4}\times7$	$12\times7\frac{1}{4}$	$12\frac{1}{2}\times7\frac{1}{2}$	$12\frac{2}{4}\times7\frac{2}{4}$
10	$11\frac{2}{4}\times6\frac{3}{4}$	$12\times7\frac{1}{4}$	$12\frac{1}{2}\times7\frac{3}{4}$	$13\frac{1}{4}\times8$	$13\frac{3}{4}\times8\frac{1}{4}$
11	$12\times7\frac{1}{4}$	$12\frac{1}{2}\times7\frac{3}{4}$	$13\frac{1}{4}\times8$	$14\times8\frac{1}{4}$	$14\frac{1}{4}\times8\frac{1}{2}$
12	$12\frac{1}{2}\times7\frac{1}{2}$	$13\frac{1}{4}\times8$	$14\frac{1}{4}\times8\frac{1}{2}$	$14\frac{1}{2}\times8\frac{3}{4}$	$14\frac{1}{2}\times8\frac{3}{4}$
13	$13\times7\frac{3}{4}$	$14\times8\frac{1}{4}$	$14\frac{1}{2}\times8\frac{3}{4}$	15×9	$15\frac{1}{2}\times9\frac{1}{4}$
14	$13\frac{1}{2}\times8\frac{1}{4}$	$14\frac{1}{4}\times8\frac{3}{4}$	15×9	$16\times9\frac{1}{2}$	$16\frac{1}{2}\times9\frac{3}{4}$
15	$14\frac{1}{2}\times8\frac{3}{4}$	15×9	$16\times9\frac{1}{2}$	$16\frac{1}{4}\times9\frac{3}{4}$	$16\frac{2}{4}\times10$
16	15×8	$15\frac{1}{2}\times9\frac{1}{4}$	$16\frac{1}{4}\times9\frac{3}{4}$	$16\frac{3}{4}\times10$	$17\frac{1}{2}\times10\frac{1}{2}$

TABLE OF JOISTS FOR STORY POSTS, TO CARRY FIVE STORIES.

Height in feet.	4 feet apart.	5 feet apart.	6 feet apart.	7 fcet apart.	8 feet apart.
	Width, thkness, inches.	Width, thkness, inches	Width, thkness, inches.	Width, thkness, inches.	Width, thkness, inches.
8	$11\frac{1}{4}\times6\frac{3}{4}$	$11\frac{3}{4}\times7$	$12\frac{1}{4}\times7\frac{1}{4}$	$12\frac{3}{4}\times7\frac{3}{4}$	$13\frac{1}{4}\times8$
9	$11\frac{3}{4}\times7$	$12\frac{1}{2}\times7\frac{1}{2}$	$12\frac{3}{4}\times7\frac{3}{4}$	$13\frac{1}{4}\times8$	$14\frac{1}{4}\times8\frac{1}{2}$
10	$12\frac{1}{2}\times7\frac{1}{2}$	$13\frac{1}{4}\times8$	$13\frac{3}{4}\times8\frac{1}{4}$	$14\frac{1}{4}\times8\frac{1}{2}$	$14\frac{1}{2}\times8\frac{3}{4}$
11	$12\frac{3}{4}\times7\frac{3}{4}$	$13\frac{3}{4}\times8\frac{1}{4}$	$14\frac{1}{4}\times8\frac{1}{2}$	15×9	$15\frac{1}{2}\times9\frac{1}{4}$
12	$13\frac{3}{4}\times8\frac{1}{4}$	$14\frac{1}{4}\times8\frac{1}{2}$	$14\frac{1}{2}\times8\frac{3}{4}$	$16\times9\frac{1}{2}$	$16\frac{1}{4}\times9\frac{3}{4}$
13	$14\frac{1}{4}\times8\frac{1}{2}$	15×9	$15\frac{1}{2}\times9\frac{1}{4}$	$16\frac{1}{4}\times9\frac{3}{4}$	$16\frac{3}{4}\times10$
14	$14\frac{1}{2}\times8\frac{3}{4}$	$15\frac{1}{2}\times9\frac{1}{4}$	$16\frac{1}{4}\times9\frac{3}{4}$	$16\frac{3}{4}\times10$	$17\frac{1}{2}\times10\frac{1}{2}$
15	15×9	$16\times9\frac{1}{2}$	$16\frac{3}{4}\times10$	$17\frac{1}{2}\times10\frac{1}{2}$	$17\frac{3}{4}\times10\frac{3}{4}$
16	$16\times9\frac{1}{2}$	$16\frac{3}{4}\times10$	$17\frac{1}{2}\times10\frac{1}{2}$	$17\frac{3}{4}\times10\frac{3}{4}$	$18\frac{1}{4}\times11$

In these Tables the walls to be supported are supposed to be constructed of brickwork.

OF THE PRICES OF MATERIALS.

The prices of timber in Boston depend in a great measure on the demand, and on the quantity brought to market. At the present time, the price is about 16 cents per cubic foot in the log, which is equal to $1 25 board measure, if to this be added 75 cents for landing, sawing, waste, profit, and delivery at the building, it will amount to $2 00 per hundred feet, which is the present average price for sawed timber, taking the long and short required throughout a building together; but if in lengths of from 30 to 60 feet alone, the average price will be $3 00 per hundred, from the extra waste and difficulty of cutting it into straight pieces of those lengths. Common floor timbers and joists, brought to market ready cut, cost per hundred $1 87 delivered. The average cost of carriage will be for timber of short lengths 25 cents per load of 500 feet board measure; but for long timbers, which require two pair of wheels, the cost will be about 50 cents per load. The average cost of the carriage of board and plank stuff, from the yard to the shops and thence to the building, is about $1 00 per thousand feet board measure.

Notwithstanding the greatest care in the selection of the lengths required in building, a considerable waste will always take place in converting the stuff to its intended purpose; an allowance equivalent to this waste should therefore be taken into account in estimating, which, when added to a fair profit to the builder, will amount to at least 25 per cent upon the prime cost of the labor and materials.

The prices here shown, are those upon which the whole of the following calculations are founded, and include the cost of carriage in addition to the prices at the lumber yards.

	$ cts.
Sawed pine timbers, from 30 to 60 feet long, taken separately at per hundred feet board measure, delivered,	3·00
Ditto, the long and short taken together, ditto,	2·00
Ditto, of white oak, ditto,	4·00
Pine floor timbers, ready cut, ditto,	1·87
Ditto wall strips, 4 by 2, and 12½ feet long, each, ditto,	0·12
Ditto joists, 4 by 3, ditto, ditto,	0·16
Albany pine planks, 9 to 10 inches wide, 12½ feet long, 1¼ thick each,	0·33
Wide pine planks, 1¼ thick, per 10 feet superficial, delivered,	0·36¼
Pine boards, dry, 9 to 10 inches wide, 12½ feet long, inch thick each, ditto,	0·17
Refuse, ditto, ditto,	0·11
Hemlock, ditto, ditto,	0·12
1¼ inches refuse pine planks, each, ditto,	0·15
Best clear white pine boards, inch thick per 10 feet super., delivered,	0·36¼
Merchantable boards, inch thick, ditto, ditto,	0·26
⅝ inch mahogany boards, at per foot, ditto, ditto,	0·20½
Inch Spanish ditto, ditto, ditto,	0·25½
Inch baywood ditto, ditto, ditto,	0·15½
Common cedar 4 feet shingles, per thousand, ditto,	24·25
Company's ditto, ditto, ditto,	27·50
Common 18 inch pine ditto, ditto, ditto,	2·37
12 feet oak laths, 2 inches by 1 inch, each, ditto,	0·08½
100 of 5 inch spikes, weighs 7 lb. 12, oz. which at 7½ cents per lb.	0·58
100 of 20d. brad heads, 3 0, 3½ inch long, ditto,	0·22½
100 of 12d. fine ditto, 1 12, 3 ditto, ditto,	0·13
100 of 10d. stout headed, 2 0, 2½ ditto, ditto,	0·15
100 of 6d. fine brad heads, 0 12, 2 ditto, ditto,	0·06

Table showing the value per foot run of scantlings, from 6 in. by 6 in. to 12 in. by 18, calculated at from $1·38 to $2·62 per hundred ft. board measure.

Scantling	At $1·38	At $1·50	At $1·62	At $1·75	At $1·87	At $2·00	At $2·12	At $2·25	At $2·38	At $2·50	At $2·62
In. In.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
6 × 6	4 1/8	4 1/2	4 7/8	5 1/4	5 5/8	6	6 3/8	6 1/2	7 1/8	7 1/2	7 7/8
6 × 7	4 4/5	5 1/4	5 3/5	6 1/4	6 1/2	7	7 2/5	7 7/8	8 2/3	8 3/4	9 1/3
6 × 8	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10	10 1/2
6 × 9	6 1/4	6 3/4	7 1/4	7 7/8	8 2/5	9	9 1/2	10 1/8	10 3/4	11 1/4	11 3/4
6 × 10	6 7/8	7 1/2	8 1/8	8 3/4	9 3/8	10	10 5/8	11 1/4	11 7/8	12 1/2	13 1/8
6 × 11	7 1/2	8 1/4	8 9/10	9 5/8	10 1/4	11	11 4/5	12 3/8	13 1/4	13 3/4	14 2/5
6 × 12	8 1/4	9	9 2/4	10 1/2	11 1/4	12	12 3/4	13 1/2	14 1/4	15	15 3/4
7 × 7	5 7/11	6 1/8	6 3/5	7 1/8	7 3/5	8 1/6	8 3/5	9 1/8	9 3/4	10 1/5	10 2/3
7 × 8	6 2/5	7	7 1/2	8 1/8	8 3/4	9 1/3	10	10 1/2	11 1/8	11 2/3	12 1/4
7 × 9	7 1/4	7 3/8	8 1/2	9 1/5	9 4/5	10 1/2	11 1/8	11 3/4	12 1/2	13 1/8	13 3/4
7 × 10	8	8 1/2	9 2/5	10 1/5	11	11 3/5	12 3/8	13 1/8	14	14 1/2	15 1/4
7 × 11	9	9 3/5	10 1/8	11 1/5	12	12 5/6	13 3/5	14 1/2	15 1/4	16	16 3/4
7 × 12	9 5/8	10 1/2	11 3/8	12 1/4	13 1/8	14	14 7/8	15 3/4	16 5/8	17 1/2	18 3/8
7 × 13	10 1/4	11 1/3	12 1/4	13 1/4	14 1/8	15 1/6	16	17	18	19	19 5/6
7 × 14	11 1/4	12 1/4	13 1/4	14 1/4	15 1/3	16 1/3	17 1/3	18 2/3	19 2/5	20 2/5	21 2/5
8 × 8	17 1/3	8	8 2/5	9 1/8	10	10 2/3	11 3/5	12	12 3/4	13 1/3	14
8 × 9	8 1/4	9	9 3/4	10 1/2	11 1/4	12	12 3/4	13 1/2	14 1/4	15	15 3/4
8 × 10	9 1/5	10	10 4/5	11 3/4	12 1/2	13 1/3	14 1/8	15	15 4/5	16 2/3	17 1/2
8 × 11	10 1/9	11	11 9/10	12 4/5	13 3/4	14 2/3	15 1/2	16 1/4	17 1/2	18 1/3	19 1/4
8 × 12	11	12	13	14	15	16	17	18	19	20	21
8 × 13	12	13	14	15 1/8	16 1/5	17 1/3	18 1/3	19 1/2	20 3/5	21 2/3	22 2/3
8 × 14	12 4/5	14	15 1/8	16 1/3	17 1/2	18 2/3	19 3/4	21	22 1/5	23 1/3	24 1/2
9 × 9	19 1/3	10 1/8	11	11 3/4	12 5/8	13 1/2	14 1/4	15 1/5	16	16 7/8	17 3/4
9 × 10	10 1/2	11 1/4	12 1/4	13 1/8	14	15	16	16 7/8	17 3/4	18 3/4	19 1/2
9 × 11	11 3/8	12 3/8	13 1/3	14 1/2	15 3/7	16 1/8	17 1/2	18 1/2	19 3/8	20 5/8	21 5/8
9 × 12	12 2/5	13 1/2	14 1/2	15 3/4	16 4/5	18	19	20 1/4	21 1/2	22 1/2	23 1/2
9 × 13	13 1/10	14 5/8	15 3/4	17 1/8	18 1/2	19 1/2	21	22 1/4	23 2/5	24 1/3	25 1/2
9 × 14	14 1/8	15 3/4	17	18 1/8	19 3/5	21	22 1/4	23 2/5	25	26 1/4	27 1/2
9 × 15	15 1/2	16 7/8	18 1/4	19 5/8	21	22 1/2	23 4/5	25 1/3	26 3/4	28 1/8	29 1/2
10 × 10	11 1/2	12 1/2	13 1/2	14 1/2	15 1/2	16 2/3	17 2/3	18 3/4	19 5/6	20 5/8	21 6
10 × 11	12 1/2	13 3/4	14 5/8	16	17 1/7	18 1/3	19 1/2	20 2/5	21 3/4	23	24
10 × 12	13 4/5	15	16 1/5	17 1/2	18 3/5	20	21 1/5	22 1/2	23 4/5	25	26 1/4
10 × 13	15	16 1/4	17 1/2	19	20 1/4	21 2/3	23	24 2/3	25 3/4	27 1/8	28 1/3
10 × 14	16 1/10	17 1/2	19	20 1/8	21 2/3	23 1/3	24 2/3	26 1/4	27 2/3	29 1/8	30 1/2
10 × 15	17 1/5	18 3/4	20 3/4	21 7/8	23 3/8	25	26 1/2	28 1/8	29 3/4	31 1/4	32 3/4
10 × 16	18 2/5	20	21 3/5	23 1/3	25	26 2/3	28 1/5	30	31 4/5	33 1/3	34 7/8
11 × 11	14	15 1/3	16 1/3	17 2/5	19	20	21 1/3	22 2/3	24	25 1/5	26 1/2
11 × 12	15 1/4	16 1/2	17 4/5	19 1/4	20 1/2	22	23 1/3	24 3/4	26 1/5	27 1/2	28 4/5
11 × 13	16 1/2	18	19 1/4	20 3/8	22 1/4	23 5/8	25 1/4	26 3/4	28 2/5	29 1/4	31 1/5
11 × 14	17 3/8	19 1/4	20 3/4	22 1/2	24	25 2/3	27 1/5	29	30 1/2	32	33 1/5
11 × 15	19	20 2/8	22 1/4	24	25 5/8	27 1/2	29 1/7	31	32 5/8	34 1/6	36
11 × 16	10 1/4	22	23 3/4	25 2/3	27 1/2	29 1/3	31 1/7	33	35	36 2/3	38 2/5
11 × 17	21 1/2	23 1/3	25 1/4	27 1/4	29 1/8	31 1/8	33	35	37	39	40 5/6
12 × 12	16 1/2	18	19 1/2	21	22 1/2	24	25 1/2	27	28 1/2	30	31 1/2
12 × 13	18	19 1/2	21	23 1/4	24 1/3	26	27 1/2	29 1/4	31	32 1/2	34
12 × 14	19 1/2	21	22 3/8	24 1/4	26 1/5	28	29 3/5	31 1/2	33 1/3	35	36 3/5
12 × 15	20 3/4	22 1/2	24 1/3	26 1/4	28	30	31 4/5	33 3/4	35 3/4	37 1/2	39 1/3
12 × 16	22	24	26	28	30	32	34	36	38	40	42
12 × 17	23 1/2	25 1/2	27 1/2	29 1/2	31 3/4	34	36	38 1/2	40 1/2	42 1/2	44 1/2
12 × 18	24 3/4	27	29 1/8	31 1/2	33 3/5	36	38 1/6	40 1/2	42 4/5	45	47 1/6

Table showing the value per foot run of scantlings, from 6 in. by 6 in. to 12 in. by 18, calculated at from $2·75 to $4·00 per hundred ft. board measure.

Scantling.	At $2·75	At $2·87	At $3·00	At $3·12	At $3·25	At $3·38	At $3·50	At $3·62	At $3.75	At $3·87	At $4·00
In. In.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
6 × 6	8¼	8⅗	9	9⅛	9¾	10⅛	10½	10⅘	11¼	11⅗	12
6 × 7	9⅝	10	10½	11	11⅜	11⅘	12¼	12⅗	13⅛	13½	14
6 × 8	11	11⅓	12	12½	13	13½	14	14½	15	15½	16
6 × 9	12⅜	12⅛	13½	14	14⅝	15⅕	15⅜	16¼	16⅞	17⅜	18
6 × 10	13¾	14⅜	15	15⅝	16¼	16⅞	17½	18⅛	18¾	19⅜	20
6 × 11	15⅛	15¾	16½	17⅛	17⅞	18½	19¼	19⅞	20⅝	21¼	22
6 × 12	16½	17¼	18	18¾	19½	20¼	21	21¾	22½	23¼	24
7 × 7	11¼	11¾	12¼	12⅘	13⅓	14	14¼	14⅘	15⅓	15⅘	16⅓
7 × 8	12⅝	13⅓	14	14⅞	15⅙	15⅘	16⅓	16⅞	17½	18	18⅔
7 × 9	14½	15⅛	15¾	16⅓	17	17⅔	18⅜	19	19⅓	20¼	21
7 × 10	16	16⅔	17½	18⅕	19	19⅔	20½	21⅛	21⅚	22½	23⅓
7 × 11	17⅝	18½	19¼	20	20⅝	21⅔	22½	23⅙	24	25⅚	25⅔
7 × 12	19¼	20⅛	21	21⅞	22¾	23⅝	24½	25⅝	26¼	27⅓	28
7 × 13	20⅝	21¾	22¾	23⅔	24½	25¾	26½	27½	28½	29⅓	30⅓
7 × 14	22⅜	23⅗	24½	25½	26½	27½	28½	29½	30½	31⅝	32⅔
8 × 8	14⅔	15⅓	16	16⅔	17⅓	18	18⅔	19⅓	20	20⅔	21⅓
8 × 9	16½	17¼	18	18¾	19½	20¼	21	21¾	22½	23¼	24
8 × 10	18⅓	19⅛	20	20⅘	21⅔	22½	23⅓	24⅛	25	25⅘	26⅔
8 × 11	20⅙	21	22	22⅘	23⅚	24¾	25⅔	26½	27½	28⅓	29⅓
8 × 12	22	23	24	25	26	27	28	29	30	31	32
8 × 13	23⅚	24⅚	26	27	28⅙	29¼	30⅓	31⅓	32⅝	33½	34⅔
8 × 14	25⅔	26⅔	28	29	30⅓	31⅓	32⅔	33½	35	36	37⅓
9 × 9	18½	19⅓	20¼	21	21⅞	22⅘	23⅝	24⅞	25⅛	26	27
9 × 10	20½	21½	22½	23½	24⅜	25⅓	26¼	27⅐	28½	29	30
9 × 11	22¾	23¾	24¾	25⅝	26⅘	27⅝	28⅞	29⅘	30⅞	31⅞	33
9 × 12	24¾	25¾	27	28⅛	29¼	30⅜	31½	32⅝	33¾	34⅞	36
9 × 13	26¾	28	29¼	30½	31⅜	33	34⅛	35¼	36½	37⅞	39
9 × 14	28⅞	29⅐	31½	32⅝	34⅛	35½	36¾	38	39⅜	40¾	42
9 × 15	30⅝	32¼	33¾	35⅝	36½	38	39⅜	41⅛	42¼	43½	45
10 × 10	23	24	25	26	27	28⅙	29⅙	30⅙	31¼	32¼	33⅓
10 × 11	25¼	26⅛	27½	28¼	29¾	31	32⅛	33⅙	34⅜	35½	36⅔
10 × 12	27½	28¾	30	31¼	32½	33¾	35	36¼	37½	38¾	40
10 × 13	29¾	31	32½	33¾	35¼	36¼	38	39¼	40¾	42	42¼
10 × 14	32⅛	33½	35	36¾	38	39⅜	40⅝	42¼	43⅜	45⅛	46⅔
10 × 15	34⅜	35⅘	37½	39	40⅝	42¼	43¾	45¼	46⅞	48⅜	50
10 × 16	36⅔	38¼	40	41⅓	43¼	45	46⅔	48¼	50	51¾	53¼
11 × 11	27¾	29	30¼	31½	32¾	34	35¼	36½	37¾	39	40¼
11 × 12	30¼	31½	33	34¼	35¾	37⅙	38½	39⅘	41¼	42½	44
11 × 13	32¾	34⅛	35¾	37⅙	38¾	40¾	41⅘	43⅛	44⅔	46	47⅔
11 × 14	35¼	36⅘	38½	40	41⅔	48¼	45	46½	48⅛	49⅔	51
11 × 15	37¾	39½	41¼	42⅞	44¾	46½	48⅛	49⅘	51¼	53⅛	55
11 × 16	40¼	42	44	45¾	47¾	49½	51¼	53	55	56⅔	58⅔
11 × 17	42⅝	44⅔	46¾	48⅝	50⅔	52⅔	54½	56½	58½	60¼	62¼
12 × 12	33	34½	36	37½	29	40½	42	43½	45	46½	48
12 × 13	35¾	37¼	39	40½	42¼	44	45½	47	48¾	50¼	52
12 × 14	38½	40¼	42	43¾	45½	47¼	49	50½	52½	54¼	56
12 × 15	51¼	43	45	46¾	48⅝	50⅔	52½	54⅓	56¼	58	60
12 × 16	44	46	48	50	52	54	56	58	60	62	64
12 × 17	46¾	48⅝	51	53	55¼	57½	59½	61⅓	63¾	65¾	68
12 × 18	49½	51¼	54	56½	58½	61	63¼	65¼	67½	69½	72

TABLE, showing the value per 10 feet run. of Joist from 3 inches by 4 inches, to 5 inches by 13 inches, calculated at from $1 25, to $2 50 per hundred feet, board measure.

Joist.	At $1 25	At $1 38	At $1 50	At $1 62	At $1 75	At $1 87	At $2 00	At $2 12	At $2 25	At $2 38	At $2 50
In. in.	cts.	cts.	cts.	cts.	cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
3 by 4	12½	13⅘	15	16⅕	17½	0.18¾	0.20	0.21⅕	0.22½	0.23⅘	0.25
3 × 5	15⅝	17¼	18¾	20¼	21⅞	.23⅜	.25	.26½	.28⅛	.29¾	.31¼
3 × 6	18¾	20 3/10	22½	24⅜	26¼	.28	.30	.31¾	.33¾	.35½	.37½
3 × 7	21⅘	24⅙	26¼	28⅓	30½	.32¾	.35	.37 1/10	.39⅓	.41⅝	.43¾
3 × 8	25	27⅗	30	32½	35	.37½	.40	.42½	.45	.47½	.50
3 × 9	28⅛	31	33¾	36½	39¼	.42	.45	.47¾	.50½	.53½	.56¾
3 × 10	31¼	34½	37½	40½	43¾	.46¾	.50	.53	.56¼	.59½	.62½
3 × 11	34 3/10	37 9/10	41¼	44½	48⅛	.51½	.55	.58 3/10	.61¾	.65½	.68¾
3 × 12	37½	41⅖	45	48⅔	52½	.56 1/10	60	.63 3/10	.67½	.71½	.75
4 × 4	16⅔	18⅖	20	21½	23¼	.25	.26⅔	.28¼	.30	.31¾	.33⅓
4 × 5	20⅚	23	25	27	29⅙	.31⅙	.33⅓	.35⅓	.37½	.39⅔	.41⅔
4 × 6	25	27⅔	30	32½	35	.37½	.40	.42¾	.45	.47½	.50
4 × 7	29⅙	32⅕	35	37¾	41	.43⅔	.46⅔	.49⅓	.52½	.55½	.58⅓
4 × 8	33⅓	36¾	40	43¼	46⅔	.49¾	.53⅓	.56½	.60	.63½	.66⅔
4 × 9	37½	41½	45	48⅔	52½	.56 1/10	.60	.63 3/10	.67½	.71½	.75
4 × 10	41⅔	46	50	54	58⅓	.62½	.66⅔	.70⅔	.75	.79⅓	.83⅓
4 × 11	45⅚	50½	55	59⅓	64⅙	.68½	.73⅓	.77⅔	.82½	.87⅓	.91⅔
4 × 12	50	55¼	60	64½	70	.74¾	.80	.84¾	.90	.95¼	.00
5 × 5	26	28¾	31¼	33¾	36½	.39	.41¾	.44⅙	.46⅞	.49½	.52
5 × 6	31¼	34½	37½	40½	43¾	.46¾	.50	.53	.56¼	.59½	.62½
5 × 7	36½	40¼	43⅔	47¼	51	.54½	.58⅓	.62	.65⅝	.69½	.73
5 × 8	41⅔	46	50	54	58⅓	.62½	.66⅔	.70⅔	.75	.79⅓	.83⅓
5 × 9	46⅞	51¾	56¼	60¾	65⅝	.70⅛	.75	.79½	.84⅜	.89¼	.83¾
5 × 10	52	57½	62½	67½	73	.78	.83⅓	.88⅓	.93¾	.99⅙	1.94⅙
5 × 11	57¼	63¼	68¾	74¼	80⅙	.85¾	.91⅔	.97⅙	1.03⅛	1.09	1.14½
5 × 12	62½	69	75	81	87½	.93½	1.00	1.06	1.12½	1.19	1.25
5 × 13	67⅝	74¾	81¼	87¾	94⅝	1.01⅓	1.08⅓	1.15	1.21⅞	1.28⅞	1.35½

APPLICATION OF THIS, AND THE FOREGOING TABLES.

Having made out the quantities of the various joist, in the way shown by the dimension book, and having ascertained the rate per hundred feet board measure, at which timber can be brought to the situation where required, (including the cost of carriage, sawing, waste, and profit,) find the price per hundred at the head of the tables, and under this head are shown the prices per foot run., or per 10 feet run., of each joist in the left hand column.

MEASURING AND ESTIMATING THE QUANTITY OF TIMBER IN BUILDINGS.

When measuring framed timbers, take the extreme length of the pieces to the ends of the tenons. Of floor joists allow for the distance they go into the walls. Of plates, ties, &c. if the joints be scarfed or lapped, allow for the extra length of each scarf or lap where they occur.

When estimating the quantity of timber required for a building, commence at the lower story, and put down in the dimension book the number of feet run of each joist in the story, with a short description of the work for which it is required opposite thereto. In all cases, take the whole of the timbers required for one story before you proceed to the next; this will avoid confusion, and lessen the risk of leaving out any part. That this may be more clearly understood, we here give the form of a *dimension book*, with some dimensions inserted; an *abstract* of the materials and labor thereon; and the whole made into a *bill*, with the prices attached to each item, taken from the foregoing tables of prices.

FORM OF THE DIMENSION BOOK.

Numb. of Pieces	Length of each.	Joist of each.	Whole number of feet run	Description of the work wherein used.	Numb. of Pieces.	Length of each.	Scantling of each.	Whole number of feet run	Description of the work wherein used.
	Ft. in.	In. in.	Ft. in.			Ft. in.	In. in.	Ft. in.	
2	35·0	6 by 3	70·0	} Partitions	35	26·0	11 by 3	910·0	} Floor
18	12·0	6 — 3	216·0		2	8·0	11 — 4	16·0	} timbers
2	18·0	6 — 3	36·0		2	40.0	4 — 3	80·0	Plates under
10	12·0	6 — 3	120·0		3	92·0	4 — 2	276·0	Wall strips
4	4·0	4 — 3	160·0	Sleepers	6	6·0	5 — 4	36·0	Lintels
35	25·0	8 — 3	875·0	} Floor	2	40·0	5 — 3	80·0	} Partitions
2	6·0	8 — 4	12 0	} timbers	2	18·0	5 — 3	36·0	
3	102·0	4 — 2	306 0	Wall strips	30	12·0	5 — 3	360.0	
6	6.0	5 — 4	36·0	Lintels.	32	26·0	10 — 3	832.0	Com. rafters

ABSTRACT OF THE JOISTS.

In. in. 6 by 3	In. in. 4 by 3	In. in. 8 by 3	In. in. 8 by 4	In. in. 4 by 2	In. in. 5 by 4	In. in. 11 by 3	In. in. 11 by 4	In. in. 5 by 3	In. in. 10 by 3
Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in	Ft. in.	Ft. in.	Ft. in.	Ft. in.
70·0	160·0	875·0	12·0	306·0	36·0	910·0	16·0	80·0	832·0
216·0	80·0			276·0	36·0			36 0	
36·0								360·0	
120·0	240·0			582·0	72·0				
								476·0	
442·0									

THE BILL.

Ft.	In.		In.	In.		$ cts.	$ cts.
442	0	run of joist,	6	by 3, at per	10 feet run,	0.36	15.91
240	0	. ditto, .	4	× 3, .	ditto, . .	0.24	5.76
875	0	. ditto, .	8	× 3, .	ditto, . .	0.48	42.00
12	0	. ditto, .	8	× 4, .	ditto, . .	0.64	0.76
582	0	. ditto, .	4	× 2, .	ditto, . .	0.12	6.98
72	0	. ditto, .	5	× 4, .	ditto, . .	0.40	2.88
910	0	. ditto, .	11	× 3, .	ditto, . .	0.62	56.42
16	0	. ditto, .	11	× 4, .	ditto, . .	0.83	1.32
476	0	. ditto, .	5	× 3, .	ditto, . .	0.30	14.28
832	0	. ditto, .	10	× 3, .	ditto, . .	0.57	47.42
4457	0	run of joist, for labor and nails, per 100 feet run,				1.58	70.42
							$264.15

It will be perceived, that the number of pieces, their lengths, joist, and whole number of feet run, are placed in separate columns, and a description of the work in a line therewith; this arrangement will not only show the quantity of timber required to each particular part of the building, but will also be serviceable as memoranda for cutting out the various lengths and joist as the work proceeds. The next process is that of collecting the several joist from the *dimension book* into the *abstract*, placing each particular joist in a separate column; the quantities obtained by adding up the contents of the columns will show the number of feet of each joist contained in the building. Write out the several quantities of joist into a *bill;* find the corresponding price to each item in the table of the prices of joist; add up the whole number of feet of joist, and find the price per hundred feet run for the workmanship in the table of prices for labor and nails.

OF FRAMING.

In preparing and fixing carcase framing, partitions, single floors, roofs, &c., it might appear that the labor to roofs and partitions differed considerably from that to single joists, notched and levelled upon plates; but if we take all the floors in a common building together, with the labor of trimming to fire-places and stairs, and the extra expense of hoisting to the upper stories, it will be found that they are worth more than the partitions; but the difference of value in the generality of cases being so trifling, we have adopted this usual and common method of computation in preference to others, from its great simplicity. For the value of this kind of work, it will be found, that the average quantity performed, by each man employed, will be from 100 to 120 feet run of the joist per day, taken collectively throughout the building. If therefore, a carpenter's wages be taken at from $1.38 to $1.50 per day, a mean average will be $1.44, and the average quantity of work performed 110 feet.

Then as 110 feet is to $1 44, so is 100 feet to $1 31; the price of journeymen's labor to this kind of work. To this add 25 per cent for the builder's profit and waste, and 5 per cent for nails, the amount will give $1.70½, as the price to be taken in making out estimates.

BATTENINGS OR FURRINGS TO WALLS.

A man can cut out in a day about twenty 12½ feet, 1¼ inch pine planks, with three cuts in each; this will produce 1000 feet run. of battens, 2¼ by 1¼ inches. He can also fix the above number of feet to wall strips in 1¼ days; and where plugging the walls is necessary, he will require 2 days to plug for the above number of feet. One thousand feet run. of battens placed 2 feet apart from centres, will cover 19 squares, of 100 feet. At 16 inches apart, they will cover 12½ squares; and at 12 inches apart, they will cover 9½ squares.

THE PRICE AT PER SQUARE, DONE IN THESE SEVERAL WAYS, WILL BE AS UNDER.

FIXED TO WALL STRIPS AT TWO FEET FROM CENTRES.		
20 pine planks, at	$0 26	$5 20
Carpenter 2½ days sawing out and fixing to wall strips,	1 44	3 50
700 nails at per C.	0 22½	1 57½
		10 27½
25 per cent for waste and profit,		2 56⅞
		$12 84⅜

Equal to 19 squares at 67⅝ cents per square.

At 16 inches from centres, the above quantities will cover 12½ squares, at 98¼ cents per square.

At 12 inches from centres, the above quantities will cover 9½ squares, at $1 30 per square.

PLUGGED TO WALLS AT TWO FEET FROM CENTRES.		
20 pine planks, at	$0 26	$5 20
Carpenter 4½ days sawing out, plugging walls and fixing,	1 44	6 48
700 nails at per C.	0 22	1 57½
		13 25½
25 per cent for waste and profit,		3 31⅜
		16 56⅞

Equal to 19 squares, at 87¼ cents per square.

At 16 inches from centres, the above quantities will cover 12½ squares, at $1 32½ per square.

At 12 inches from centres, the above quantities will cover 9½ squares, at $1 74½ per square.

CENTERINGS TO VAULTS, &c.

Cost of a centre on three ribs, 12 feet long and 6 feet diameter.

			$ cts.
11 refuse pine boards for covering, 4 Ditto for ribs,	= 15,	at $0 11	1 65
Carpenter a day,			1 44
200 10d. nails,		0 10	0 20
			3 29
25 per cent for waste and profit,			0 82¼
Per square,			$4 11¼

BRACKETING.

A man can, in a day, cut out and fix up, at 16 inches apart, the brackets for a cornice 25 feet long, by 18 inches girt on the face. The cost per foot will be as under: —

		$ cts.
3 pine boards,	at 17 cents	0 51
100 nails,		0 15
Carpenter 1 day,		1 44
		2 10
25 per cent for waste and profit,		0 52½
		2 62½

Producing 37½ feet, at 7 cents per foot, upon the lathed face.

SHINGLING.

Of cedar shingles, average 30 in. by 7¼ in 198 will lay a square in 10 in. courses.
Ditto, . . . ditto, . 220 . . . 9 ditto.
Ditto, . . . ditto, . 248 . . . 8 ditto.

The price per square, at the above gauges, will be as under, for work done with "Company's Shingles."

FOR TEN INCH COURSES.

WITH PINE LATHS.			WITH OAK LATHS.		
198 shingles at per M.	$27 50	$5 44	198 shingles at per M.	$27 50	$5 44
8 lengths of laths,	0 05	0 40	8 lengths of laths,	0 08½	0 68
325 nails at per C.	0 10	0 32½	325 nails at per C.	0 10	0 32½
Carpenter 5 hours at	0 14⅖	0 72	Carpenter 5 hours at	0 14⅖	0 72
		6 88½			7 16½
25 per cent,		1 72⅛	25 per cent,		1 79⅛
Per square,		$8 60⅝	Per square		$8 95⅝

SHINGLING.—Continued.

FOR NINE INCH COURSES.

PINE LATHS.		OAK LATHS.	
220 shingles . .	$6 05	220 shingles . .	$6 05
9 lengths of laths .	0 45	9 lengths of laths .	0 76½
350 nails . . .	0 35	350 nails . . .	0 35
Carpenter 7 hours .	1 00	Carpenter 7 hours .	1 00
	7 85		8 16½
25 per cent,	1 96¼	25 per cent,	2 04⅛
Per square,	$9 81¼	Per square,	$10 20⅝

FOR EIGHT INCH COURSES.

PINE LATHS.		OAK LATHS.	
248 shingles . .	$6 82	248 shingles . .	$6 82
10 lengths of laths .	0 50	10 lengths of laths .	0 85
400 nails	0 40	400 nails . .	0 40
Carpenter 8 hours .	1 15⅕	Carpenter 8 hours .	1 15⅕
	8 87⅕		9 22⅕
25 per cent	2 21¼	25 per cent,	2 30
Per square,	$11 09	Per square,	$11 52⅕

Of common 18 inch pine shingles, average 5 inches wide, a square will require 640, laid in 4½ inch courses.
Ditto, . . . 720, laid in 4 inch courses.

FOR 4½ INCH COURSES.

640 shingles, at per bundle of 500. . $2 37	$3 03	
10½ refuse, pine boards, 11	1 15½	
11 lbs. of nails, . 7½	0 82½	
Carpenter, 7 hours, 14⅖	1 00	
	6 01	
25 per cent,	1 50¼	
Per square,	$7 51¼	

FOR 4 INCH COURSES.

720 shingles, at per bundle, $2 37	$3 41	
10½ refuse pine boards, 11	1 15½	
12 lbs. of nails, . 7½	0 90	
Carpenter, 8 hours, 14⅖	1 15	
	6 61½	
25 per cent,	1 65⅜	
Per square,	$8 26⅗	

SCALE OF PRICES FOR LABOR AND NAILS ONLY.

	Builders' prices for labor and nails only.	Journeymen's prices for labor only.
The Value of the Materials being ascertained as already shown.	$ cts.	$ cts.
Preparing, raising and fixing carcase framing, single floor joists, braced and single stud partitions, shed, span, or collar braced roofing, at per hundred feet run. of the joist taken collectively throughout, in common size dwelling-houses, ...	1 70	1 31
Framing, raising, and fixing roofs only, with tie-beams, king posts, braces, and principals; the common rafters notched down across the backs of principal rafters, at per hundred feet board measure, ...	2 19	1 75
Ditto, to roofs of from 50 to 60 feet span, with tie-beams, king and queen posts, struts, purlins, principals, and common rafters notched down upon the purlins; the ceiling joists notched and spiked to tie-beams or binders, and the trusses not exceeding 10 feet apart, at per hundred feet board measure, fixing irons included, ...	2 50	2 00
Ditto, to square framed tower of churches, &c., do.	2 50	2 00
Ditto, to octagonal framed ditto, "	2 65	2 12
Ditto, to carcase framing of wooden buildings, "	62½	50
Ditto, to com. floor beams, notched upon plates, "	40	32
Ditto, to com. roofs, with gallows frame & rafters, "	62½	50
Ditto, to binders, framed between girders, "	62½	50
Girders to floors, sawn, reversed, and bolted together, per foot run.,	25	20
Ditto, from 12 to 15 inches deep, and from 25 to 30 ft. long, with iron trusses, abutments, and bolts, per foot run.,	62½	50
Ditto, from 15 to 18 inches deep, and from 30 to 35 ft. long, ...	75	60
Bridging and ceiling joists, notched and nailed to binders at per hundred feet run.,	1 69	1 35
Plates, bonds, and lintels, raised and bedded, at ditto,	94	75
Hewing, bedding, and laying cellar sleepers, at ditto,	62½	50
Cutting in and nailing herringbone-strutting, per ft. run.	03	02
Inch pine, rough board, nailed down, at per square.	31	25
Ditto, and the edges jointed only, . . . "	62½	50
Ditto, of merchantable boards, planed, jointed and matched, . . . at per square,	1 40	1 12
Ditto, ditto, with edges matched and beaded, "	1 71	1 37
Ditto, lapped and beaded, as clapoarding, "	1 87	1 50
Ditto, planed, matched and beaded, enclosures to towers, &c., . . at per square,	2 50	2 00

SCALE OF PRICES, &c.—Continued.

	Builders' prices for labor and materials only.	Journeymen's prices for labor only.
	$ cts.	$ cts.
Inch pine, merchantable pine boards, matched and beaded, with tongued headings and narrow boards, ... at per square,	2 88	2 25
If any of the above be planed 2 sides, add extra, "	31	25
If of 1¼ inch stuff, ... add . . "	12½	10
Planing sawn, pine timber, per hundred feet super.,	40	32
Ditto, and hewing the sides from the log, "	1 25	1 00
Narrow chamfered edges, . . per foot run.,	01¼	01
Wide ditto, ... "	02½	02
Sunk rebate, up to 2 in. by ¾ inches, . . "	02	01½
Ditto, from 2 by ¾ in. to 3 in. by 1¼ inches, "	03	02½
Beads, up to ¾ of an inch, ... "	01¼	01
Ditto, from ¾ in. to 1¼ inches, . . . "	02	01¼
Fixing bolts and iron work, . . per pound,	02	01½

All return beads to be double price; all circular timbers, flat sweep, 1½ times; quick sweep, twice; elliptical, twice and a half; and circular circular, four times the price of straight, of the same denomination.

BATTENINGS, OR FURRINGS TO WALLS AND CEILINGS.	Builders' prices for all materials.	Journeymen's prices for labor only.
Inch battenings, cut out and fixed to wall strips, 16 in. apart, ... per square,	80¾	28
Ditto, plugged to walls, . . . "	1 10½	50
1¼ inch ditto, fixed to wall strips, at 2 feet spaces, "	67⅝	18¾
Ditto, ... 16 inch " "	98⅘	28
Ditto, ... 12 inch " "	1 30	37
Ditto, plugged to walls, . 2 feet " "	87¼	34⅛
Ditto, ... 16 inch " "	1 32½	51⅕
Ditto, ... 12 inch " "	1 74½	68¼
CENTRES TO ARCHES.		
Common centres to vaults, on three proper inch ribs, covered with inch boards, and fixed on bearers, per square,	4 11	1 44
Centres fixed for groined arches, ditto, per foot super.	12	08
Ditto, for small ditto . "	16	10
Ditto, cradled, on ribs for brick arches to doors and windows, to be taken on the soffit, per foot super.	08	04
Ditto, to semicircular heads, with cradling on ribs, "	10	04

BRACKETING, INCLUDING PLUGGING.	Builders' prices for all materials.	Journeymen's prices for labor only
Of 1¼ inch pine, for cornices, measuring where lathed, per foot super.	07	04
Of 1½ ditto, ... "	08	04½
Of two thicknesses with inch boards, . . "	12	07
For every angle bracket, add 1 foot of the cornice		
If circular on plan, 1½ times the price of straight.		
Beams and margins to large ceilings, measured where lathed, ... per foot super.	05	03
Ditto, to small ditto, and margins of panels, "	06	04
Bracketing to wagon headed ceilings, . . "	06	04
Ditto, . to semicircular . ditto, . . "	08	05
Ditto, . to small . . ditto, . . "	12	06
Ditto, . to groins in passages exceeding 4 feet wide per foot super.	18	10
Ditto, . to ditto, under 4 feet wide . . "	25	12
Ditto, . to elliptical ceilings, large, . . "	10	06
Ditto, . to small ditto, ... "	15	08
Ties and braces to walls and ceilings extra.		
WEATHER BOARDING.		
Inch pine boards, rough, and nailed on, per square,	1 87	25
Ditto, edges sprung, . ditto, . . ditto.	2 32	60
Ditto, clear stuff, planed and jointed, nailed on, ditto,	2 75	75
Ditto, and beaded, . . . ditto, ditto,	3 00	1 00
Ditto, planed both sides, . . ditto, ditto,	3 40	1 37
Ditto, tongued and beaded, or lapped, . ditto,	3 62	1 50
Ditto, narrow boards, . . ditto, ditto,	4 50	2 00
If 1¼ inch, add to the above prices, . . ditto,	85	12
LUFFER BOARDING.		
Inch pine wrought and splayed both edges, and fixed into frames, measured on the face, per foot super.	18	12
1¼ inch ditto, ... ditto,	25	14
Ends of shifting ditto, with pins, including the shifting lath and staples, ... each	06	03
TRAP DOORS, OR SCUTTLES IN ROOFS.		
Scuttles with frame and inch tongued and beaded shutter, battened and hung with strap hinges and bolt inside complete, (measuring upon the face only) per foot super.	56	12
Ditto, with glazed sash instead of shutter, made to slide up and down the roof, including lines and pulleys, per foot super.	75	15
Planed common step ladder to ditto, . per step,	37	13
Ditto, rough, ... ditto,	26	06

SHINGLING.	Builders' prices for all materials.	Journeymen's prices for labor only.
3 feet "Company's" cedar shingles, on pine laths, at 10 inch courses, jointed and laid, per square,	8 60⅝	72
Ditto, at 9 inch courses, ... ditto,	9 81	1 00
Ditto, at 8 inch courses, ... ditto,	11 09	1 15½
Ditto, on oak laths, at 10 inch courses, . ditto,	8 95⅝	72
Ditto, . . at 9 inch courses, . ditto,	10 20⅝	1 00
Ditto, . . at 8 inch courses, . ditto,	11 52¾	1 15½
Common 18 inch pine shingles, on rough pine boarding, at 4½ inch courses, . . per square,	7 51¼	1 00
Ditto, at 4 inch courses, ... ditto,	8 26⅞	1 15
Old shingles taken off and relaid, . . ditto,	1 50	1 25
Valleys, shingled, ... per foot run.	75	13
Hips, ditto. . . . . ditto,	18	06
Valleys or hips prepared and boarded for lead, ditto,	16	10
Rounded hip or ridge rolls, for lead, fixed, ditto,	12	06
Inch barge boards, fixed rough, . . ditto,	02	00¾
Ditto, . planed, ... ditto,	02½	01
Ditto, . planed and beaded, . . ditto,	03	01¼
Corner boards, if single, the same as barge boards; and if double, double price.		
OUTSIDE CORNICES AND GUTTERS.		
1¼ inch plain moulded single cornice, with corona, crown, and bed moulds; girting from 20 to 30 inches, ... per foot super.	21	10
Ditto, . . . from 30 to 40 inches, ditto,	23	11
Ditto, . . . from 40 to 50 inches, ditto,	25	12
If 1½ inch stuff, add to the above prices, extra, ditto,	06	02
If 2 . add . . . . ditto,	12	03
Plain blocks to ditto, girted face and edge, for the width, by the whole length, extra, . per foot super.	15	08
Dentil or fret cut bed mould, (per inch on the face,) . . . . . per foot run.	04	02
Inch plain frieze and architrave of narrow boards tongued the joints carefully put together with white lead, and fixed to furrings at back, per foot super.	08	03
1¼ inch ditto, ... ditto,	10	03½
1½ inch ditto, ... ditto,	12	04
Architrave moulding,(per in. girt on the face,) per ft. run.	02	01
Carved bed mould, with egg and tongue, or leaf and dart, ... per foot run.	42	31
GUTTERS.		
Common square gutter, 5 in. by 8 in, per foot run.	25	08
Old gutters taken down, and new ones put up, add ditto,	08	06
Inch boards prepared and laid in gutters, with proper drips and currents, on furrings or bearers, for lead or copper, . . . per foot super.	08	03

BALUSTRADES.	Builders' prices for all materials.	Journeymen's prices for labor only.
Balustrades over cornices, the balusters 5 inches diam. turned and fixed with proper moulded rail and plinth, ... at per foot run.	$1 25	40
Plain balustrades to rear of buildings, . . ditto,	50	13
TRUNKS.		
Inch trunks 4½ in. square, put together with white lead, and pitched in the angles, and fixed, per foot run.	12	06
If ploughed and tongued, ... add ditto,	03	02
Each joint, ... add ditto,	12	10
Each elbow, ... add ditto,	18	12
Bevilled hopper heads, for each side or front, each	18	12
Moulded and capped ditto, ... ditto,	25	16
Inch pine arris gutters, pitched joint, per foot run.	12	06
Ditto, open trough, 4 inches clear, . . ditto,	12	06
Inch fillet gutter, ... ditto,	10	04
Scaffolding for fixing holdfasts, brackets, &c. to be charged extra; water trunks to be measured from top to bottom, allowing 3 inches for each joint.		
DRIVING PILES.		
Round timber piles, pointed and driven, per foot run.	50	10
SOUND BOARDING.		
Rough boards, cut in and fixed upon fillets, per square,	2 81	60
Ditto, . and filletted on top, . . ditto,	3 50	1 00

JOINERS' WORK.

PARTICULARS RELATING TO FLOORING.

Of 1¼ inch boards, 12½ feet long, planed, with tongued edges; a man can prepare 25 in a day.
9½ Boards, average 9 inches wide, will lay a square of rough flooring.
10 Ditto, with edges shot straight, will lay a square of clinks.
10½ Ditto, grooved and tongued, will lay a square of flooring.
13 Ditto, ditto, sawn down the middle, will lay a square of narrow batten flooring.
A square of common flooring will require 200 nails.
A square of batten flooring will require 400 nails.

PRICE OF A SQUARE OF ONE AND A QUARTER INCH TONGUED PLANK FLOORING.

10½ Inch and a quarter planks, 12½ feet long, at		22 cts.	$2 31
200 Nails,		09	0 18
Carpenter, 1 day,			1 44
			3 93
	20 per cent profit,		0 78½
			$4 71½

PRICE OF A SQUARE OF BEST NARROW BATTEN FLOORING.

13 Inch and quarter clear pine planks, 12½ feet long, at		33 cts.	$4 29
400 Nails,		09	0 36
Carpenter, 1¼ days,		$1 44	2 52
			7 17
	20 per cent profit,		1 43½
			$8 60½

SKIRTINGS AND BASES.

Calculation of the price of plinth, and base moulding, fixed to planed grounds and fillets, at per foot run. complete.

		Materials and Labor.	Labor only.
1¼ Inch planed grounds, fixed to walls,	per foot run.	$0 02¼	01¼
1¼ Planed and rebated plinth, board wide, fixed to walls,	"	08	03
Plugging for grounds, fillet on floor, and backings,	"	02	01
Quirked base moulding 6 inches girt, fixed complete,	"	10	05
		$0 22¼	0 10¾

OF SASH FRAMES.

Calculation of the price of a common cased sash frame, for a pair of 12 light sashes, the squares each 16 in. by 11, with iron pulleys, rebated and sunk sill, inch grooved casings, with beads, parting slips, and hanging stiles for outside shutters, complete.

4 Feet super. of 2½ inch plank for head and sill, at	09 cts.	$0 36
4½ Pine boards, for pulley stiles, castings, beads, &c.	17	75
2 pair of pulleys,	09	18
100 nails,		09
Carpenter, 9 hours,	14	1 26
		2 64
20 per cent profit,		53
		$3 17

This will produce 24 ft. 9 in. super. on the face at 13 cents nearly; or 18 feet run. of the frame measured inside, at 17⅞ cents per foot.

The workmanship only to ditto, 5 cents per foot super., or 7 cents per foot run.

OF SASHES.

Calculation for a pair of 12 light $1\frac{3}{8}$ inch sashes, the squares each 16 in. by 11 in.

6 Feet super. of $1\frac{1}{2}$ inch clear plank, ...	at 6 cts.	$0 36
Workmanship to twelve lights, as above	7	0 84
		1 20
20 per cent profit,		0 24
		$1 44

This will produce 18 ft. 9 in. super. of sashes, at $7\frac{3}{4}$ cents per foot super. The workmanship only to ditto, $4\frac{1}{2}$ cents per foot super.

Calculation for a pair of $1\frac{3}{4}$ inch sashes, of the above sizes.

6 Feet super. of 2 inch clear plank. . . .	at 8 cts.	$0 48
Workmanship to twelve lights, ...	8	0 96
		1 44
20 per cent profit,		0 29
		$1 73

This will produce 18 ft. 9 in. super. of sashes, at $9\frac{1}{4}$ cents per foot. The workmanship only to ditto, 5 cents per foot.

PARTICULARS RELATING TO DOORS.

A joiner can make a common size 4 panel $1\frac{3}{8}$ pine door, moulded both sides, ... in 1 day.
Ditto, a 6 panel, ditto . . . . . in $1\frac{1}{4}$ days.
Ditto, a 4 panel $1\frac{3}{4}$ inch door, moulded both sides, . . in $1\frac{1}{4}$ days.
Ditto, a 6 panel ditto, ... in $1\frac{1}{2}$ days.

Calculation for a four panel $1\frac{3}{8}$ inch door, 7 ft. 6 in. by 3 ft. 0 in. moulded both sides.

15 Feet super. of $1\frac{1}{2}$ inch plank.	at 6 cts.	$0 90
32 Ditto, of panel and moulding stuff, ...	4	1 28
Brads, ...		0 05
Carpenter, 1 day, ...		1 44
		3 67
20 per cent profit,		0 73½
		$4 40½

This will produce 22 ft. 6 in. super. at $19\frac{1}{2}$ cents per foot. The workmanship only, to ditto, $6\frac{1}{2}$ cents per foot.

As Joiners' work consists of articles too numerous to be detailed in calculations like the foregoing; we give the following prices of each article ascertained, on similar principles, by which the correct value of all kinds of work can be easily determined by superficial measurement.

FLOORS.

	Builders' prices for all materials.	Journeymen's prices for labor only.
Inch pine refuse boards, nailed down rough, per ft. sq.	$ 1 92	0 32
Ditto, planed, and the edges tongued, . ditto,	2 80	1 00
1¼ Refuse planks, rough, and nailed down ditto,	2 76	0 50
Ditto, medium quality planks, planed, edges tongued and laid, per ft. sq.	4 71½	1 44
Ditto, clear planks, ripped down, and laid in narrow pattens, in best manner, with edges tongued, ... per ft. sq.	8 60½	2 52
Ditto, dowelled batten floors, and edges nailed, ditto,	9 75	3 50
If any of the above are planed to thickness, add, ditto,	14½	0 12
Borders to hearths, mitred and glued down, per ft. run.	12	0 08

SKIRTINGS AND BASES,

INCLUDING FILLETS ON THE FLOOR AND BACKING PIECES.

Inch pine, board wide, planed and fixed square, per ft. run.	05½	02½
Ditto, with torus stuck on, and fixed, . . ditto,	06	03
1¼ Inch, board wide, planed and fixed square, ditto,	06½	02½
Ditto, with torus stuck on, and fixed, . . . ditto,	07	03
Ditto, fixed raking, ... ditto,	08	04
Ditto, rebated, as plinth, and fixed to grounds, ditto,	08	08
Ditto, double faced ditto, with base moulding, 4 inches girt fixed on top, ditto,	18	08
Ditto, ditto, with moulding 6 inches girt, . ditto,	22¼	10¾
If of 1½ inch stuff, add . . . . . ditto,	02	01
If plugged to walls, add . . . . . ditto,	01½	01
1¼ Inch ditto, level circular, with torus . . ditto,	10	04½
Ditto, raking circular, . . ditto, . . ditto,	12	06
Ditto, grooved and backed on cylinder, . . ditto,	35	25
Narrow skirting grounds, planed and fixed, per ft. run.	02¼	01½
Ditto, ramped, or circular, ... ditto,	04	03
Ditto, wreathed in thicknesses . . . ditto,	08	06
If dove-tailed, add for each angle . . . ditto,	02	01½

	Builders' prices for all materials.	Journeymen's prices for labor only.
SASH FRAMES,		
EXCLUSIVE OF FIXING.		
Cased frames, with sunk sills for 1¾ inch sashes, with slips, beads, and pulleys; prepared to hang double; and hanging stiles for outside shutters; measured from out to out of castings each way upon the face . . . . . per ft. super.	$ 13	05
Ditto, ditto, measured inside of frame . per ft. run.	17½	07
Ditto, with circular head measured square, . ditto.	25	10
Ditto, circular on plan, (flat sweep,) . . ditto,	18	08
Ditto, ditto, (½ inch to the foot), ditto,	20	10
If for 2½ inch sashes, add on the straight, . ditto,	03	01
Frames as above, with mahogany pulley stiles and beads, and brass axle pulleys, . ditto,	25	08
Ditto, with circular head measured square, . ditto,	50	21
Ditto, circular on the plan, flat sweep, . ditto,	32½	15
VENETIAN AND PALLADIAN FRAMES.		
Venetian cased frames, with sunk sills for 1¾ in. sashes, with iron pulleys prepared to hang double, ... per ft. super.	15	04½
Ditto, circular on the plan, flat sweep, . ditto,	25	10
Ditto, ½ inch to the foot, ... ditto,	28	12
If for 2½ inch sashes, add . . . . ditto,	03	02
Ditto, on the circular, add . . . ditto,	06	04
Palladian head, measured square, . . ditto,	37½	25
Ditto, circular ditto, ... ditto,	1 00	75
If any of the above have mahogany pulley pieces and boads, add on the straight, ditto,	10	04
Ditto, on the circular, ... ditto,	12	06
If with double pulley stiles betwixt centre and side lights, add . . . . ditto,	06	03
Ditto, on the circular, add . . . . ditto,	08	04

	Builders' prices for all materials.	Journeymen's prices for labor only.
FRENCH CASEMENT FRAMES.		
Plain solid frames, weathered and throated sills for 1¾ casement sashes on the face, ... per ft. super.	$ 12	05
Ditto, with mahogany stiles and beads, for 1¾ casements, ... ditto,	18	08
If for 2½ sashes, add on the pine, . . ditto,	03	02
Ditto, on the mahogany, ... ditto,	06	03
Circular on plan, flat sweep, 1½ times the straight.		
Quick sweep, double the straight.		
SASHES ONLY, EXCLUSIVE OF HANGING.		
1⅜ inch ovolo pine sashes, on the face, per ft. sup.	07¾	04½
Ditto, circular head measured square, ditto.	18	13½
Ditto, with chord bar down to the meeting rail, ditto,	20	15
Ditto, circular on plan, ½ inch to the foot, ditto,	12	08
Dttto, ditto, ¼ inch to the foot, ditto,	15	10
1¾ inch ovolo, ... ditto,	09¼	05
Ditto, circular head measured square, . ditto,	20	15
Ditto, with chord bar down to the meeting rail, ditto,	22	17
Circular on plan ½ inch, to the foot, . ditto,	15	10
Ditto, ditto, ¼ inch, to the foot, . ditto,	18	12
Circular, circular head, ½ inch to the foot, ditto,	62½	50
Ditto, ditto, ¼ inch to the foot, ditto,	75	62½
If 2½ inch, add on the 1¾ ovolo, . . ditto,	02¼	01⅜
Ditto, on circular, add . . . . . ditto,	10	06
If 1¾ baywood mahogany sashes, . . ditto,	25	08
Ditto, circular on plan, ... ditto,	37½	16
If 2½ ditto, straight, ... ditto,	28	10
Ditto, circular on plan, ... ditto,	44	20
Fitting in sashes, ... per window.	15	12
Hanging sashes, with the chord included, ditto,	50	25
Ditto, exclusive of the cord . . . ditto,	38	25

		Builders' prices for labor and nails only.	Journeymen's prices for labor only.
VENETIAN BLINDS			
Standing blinds, including hinges hung complete,	per ft. sup.	$ 34	11
Rolling blinds, ditto,	ditto,	38	15
If painted, add ditto,	ditto,	08	
STORE FRONT, OR SHOW SASHES.			
1⅜ Pine, ovolo sashes,	per ft. sup.	08	04½
1¾ Ditto, ditto,	ditto,	09½	05
Ditto, circular on plan, flat sweep,	ditto,	12	08
Ditto, ½ inch to a foot,	ditto,	16	10
Ditto, elliptical, or quick corners,	ditto,	25	18
Ditto, circular, head, measured square,	ditto,	21	14
Ditto, circular, circular head, ditto,	ditto,	60	50
If 2½ inch, add on the 1¾ inches,	ditto,	02	01½
1⅜ mahogany sashes,	ditto,	18	07½
1¾ ditto, ditto.	ditto,	24	08
Ditto, circular on plan, flat sweep,	ditto,	32	12
Ditto, ½ inch to the foot,	ditto,	40	16
Ditto, elliptic, or quick corners,	ditto,	50	25
Ditto, circular head, measured square,	ditto,	45	16
Ditto, circular, circular head, ditto,	ditto,	75	48
If 2½ inch, add upon the 1¾ straight mahogany,	ditto,	05	02
If circular ditto,	ditto,	10	05
If any of the above sashes break under the bressumer, add on each return,	ditto,	75	38
If Spanish mahogany, add on the 1¾ inch,	ditto,	08	03
Ditto, on the 2½ inch,	ditto,	10	04
1¾ inch pine, ovolo, cant bar,	per ft. run.	10	08
Ditto, mahogany,	ditto,	15	10
Pine angle bar,	ditto,	10	08
Mahogany, ditto,	ditto,	15	10
If 2½ inch ditto, add	ditto,	04	02
If astragal and hollow, add on the straight,	per ft. sup.	03	02
If Gothic bar, or lambs-tongue, add	ditto,	04	03
Pine guard beads,	ditto,	02	01
Ditto, half beads,	ditto,	01	00¾
Mahogany ditto,	ditto,	02	01
Circular, ditto, treble price.			

PRICE OF SASHES, GLAZED WITH ENGLISH CROWN GLASS.

Size of the square.	1⅜ in. Sashes.	1¼ in Sashes.	Size of the square.	1⅜ in Sashes.	1¼ in. Sashes.
In. In.	Cts.	Cts.	In. In.	Cts.	Cts
22 by 17	86	90	16 by 9	30	32
22 × 16	76	80	15 × 13	42	44
22 × 15	76	80	15 × 12	32	34
22 × 14	72	75	15 × 11	30	32
22 × 13	67	70	15 × 10	28	30
22 × 12	67	70	15 × 9	28	30
21 × 16	77	80	14 × 13	42	44
21 × 15	72	75	14 × 12	33	34
21 × 14	67	70	14 × 11	28	30
21 × 13	63	66	14 × 10	25	27
21 × 12	63	66	14 × 9	25	27
20 × 16	72	75	13 × 12	32	34
20 × 15	67	70	13 × 11	26	28
20 × 14	63	66	13 × 10	23	25
20 × 13	63	60	13 × 9	23	25
20 × 12	53	56	13 × 8	23	25
19 × 15	63	66	12 × 12	32	34
19 × 14	63	66	12 × 11	26	28
19 × 13	50	53	12 × 10	18	20
19 × 12	45	48	12 × 9	16	18
19 × 11	45	48	12 × 8	16	18
18 × 15	67	70	11 × 11	26	28
18 × 14	45	48	11 × 10	18	20
18 × 13	44	46	11 × 9	15	16
18 × 12	41	44	11 × 8	15	16
18 × 11	37	40	10 × 10	18	20
18 × 10	37	40	10 × 9	15	16
17 × 15	45	48	10 × 8	12	13
17 × 14	43	46	9 × 9	15	16
17 × 13	43	46	9 × 8	12	13
17 × 12	37	40	9 × 7	12	13
17 × 11	35	38	8 × 8	12	13
17 × 10	33	36	8 × 7	11	12
16 × 14	43	46	8 × 6	11	11
16 × 13	41	44	7 × 6	11	11
16 × 12	35	38	7 × 5	8	8
16 × 11	31	34	7 × 4	8	8
16 × 10	30	32	6 × 4	7	7

The above, and the following list of glazed sashes, show the prices paid to the sash-maker; so that 20 per cent for the builder's profit should be added thereto, in the making out estimates or valuations.

PRICES OF SASHES, GLAZED WITH BOSTON CROWN GLASS OF SECOND QUALITY.

Size of the squares.	1¾ inch Sashes.	1¼ inch Sashes.	Price of the glass pr. light	Size of the square.	1¾ inch Sashes.	1¼ inch Sashes.	Price of the glass pr. light
In. in.	$ cts.	$ cts.	$ cts.	In. in.	Cts.	Cts.	Cts.
22 by 17	1.22	1.25	1.12	16 by 9	44	46	26
22 × 16	1.04	1.07	94	15 × 13	43	45	35
22 × 15	88	91	78	15 × 12	39	41	31
22 × 14	81	84	71	15 × 11	37	39	29
22 × 13	75	78	65	15 × 10	34	36	26
22 × 12	70	73	60	15 × 9	31	33	23
21 × 16	88	91	78	14 × 13	39	41	31
21 × 15	82	95	72	14 × 12	38	40	29
21 × 14	75	78	65	14 × 11	34	36	26
21 × 13	70	73	60	14 × 10	31	33	23
21 × 12	65	68	55	14 × 9	30	32	22
20 × 16	81	84	71	13 × 12	34	36	26
20 × 15	75	78	65	13 × 11	31	33	23
20 × 14	70	73	60	13 × 10	30	32	22
20 × 13	65	68	55	13 × 9	28	30	20
20 × 12	60	63	50	13 × 8	24	26	16
19 × 15	70	73	60	12 × 12	31	33	23
19 × 14	65	68	55	12 × 11	30	32	22
19 × 13	60	63	50	12 × 10	28	30	20
19 × 12	56	59	46	12 × 9	24	26	16
19 × 11	51	54	41	12 × 8	21	23	14
18 × 15	65	68	55	11 × 11	27	29	20
18 × 14	60	63	50	11 × 10	23	25	16
18 × 13	57	60	47	11 × 9	21	23	14
18 × 12	51	54	41	11 × 8	19	21	13
18 × 11	47	50	38	10 × 10	21	23	14
18 × 10	43	45	34	10 × 9	19	21	12
17 × 15	59	61	50	10 × 8	16	18	9
17 × 14	55	57	46	9 × 9	16	18	9
17 × 13	50	52	41	9 × 8	15	17	8
17 × 12	47	49	38	9 × 7	14	16	7
17 × 11	44	46	35	8 × 8	14	16	8
17 × 10	40	42	31	8 × 7	13	15	7
16 × 14	50	52	41	8 × 6	11	13	5
16 × 13	46	48	38	7 × 6	11	13	5
16 × 12	43	45	35	7 × 5	10	12	4
16 × 11	40	42	32	7 × 4	10	12	4
16 × 10	38	40	30	6 × 4	10	12	4

WHOLESALE PRICES OF PLATE GLASS, IN BOXES.

Size of the squares.	Price per square.		Size of the squares.	Price per square.	
	Green.	White.		Green.	White.
In. in.	$ cts.	$ cts.	In. in.	$ cts.	$ cts.
26 × 17	2 50	3 00	18 × 13	92	1 25
26 × 16	2 20	2 75	18 12	85	1 00
24 × 15	1 88	2 50	17 16	1 25	1 62½
22 × 14	1 50	2 00	17 15	1 12½	1 50
22 × 13	1 31	1 75	17 14	1 00	1 37½
21 × 13	1 25	1 62½	17 13	85	1 25
20 × 13	1 20	1 50	17 12	80	1 12½
20 × 12	1 95	1 31	16 15	90	1 37½
18 × 17	1 62½	1 87½	16 14	80	1 12½
18 × 16	1 50	1 75	16 13	75	1 00
18 × 15	1 25	1 50	16 12	70	88
18 × 14	1 00	1 37	14 10	45	65

FRENCH CASEMENT SASHES.

	Builders' prices for all materials.	Journeymen's prices for labor only.
1⅜ pine ovolo French casements, per foot super.	$ 09	04½
2¾ ditto, ... ditto,	10	05
1½ ditto, ... ditto,	12	07
1⅜ Spanish mahogany ditto, . . . ditto,	20	08
2¾ ditto, ... ditto,	25	09
¼ ditto, ... ditto,	32	12
If in two heights, add for pine, . ditto,	03	02
Ditto, . add for mahogany . ditto,	40	03
Circular on plan, flat sweep 1½ times the straight,		
Ditto, exceeding ½ inch to the foot, double ditto, .		
If astragal and hollow or other modern bar, add per foot super.	01½	01
If with bevilled bars up to the rebate, add ditto.	01½	01
Extra rebated edges, grooves, &c. per foot run, .	00¾	00½

SKYLIGHTS.

1⅜ pine ovolo skylights, . . per foot super.	07	04
Ditto, on an irregular plan, . . . ditto,	08	05
Ditto, hipped, ... ditto,	14	10

SKYLIGHTS, Continued.	Builders' prices for all materials.	Journeymen's prices for lab'r only.
1⅜ pine ovolo skylights, hipped, on an irregular plan, per foot super.	$ 15	11
1¼ pine ovolo, plain, ... ditto,	08	05
Ditto, on an irregular plan, . . . ditto,	09	06
Ditto, hipped, ... ditto,	15	11
Ditto, on an irregular plan, . . . ditto,	16	12
For every ½ inch extra thickness, add ditto,	02	02
Circular ribs of 1¼ pine in two thicknesses, splayed per foot run,	08	04
1⅜ inch ditto, ... ditto,	09	04
1½ ditto, ... ditto,	10	04½
If elliptical, . add . . . ditto,	02	01½

FAN LIGHT FRAMES.

1⅜ pine, square framed, . . per foot super.	12	06
Do. with semicircular head measured square, ditto,	15	06
1¼ pine, square framed, ... ditto,	13	07
Ditto, with semi-head, ... ditto,	16	09
If elliptical, . add . . . ditto,	04	03
If circular on plan, to be double the straight.		

FRAMED BACK LININGS.

1 or 1¼ inch pine, plain, . . per foot super.	10	05
Ditto, 2 panel bead butt, . . . ditto,	14	08
Ditto, 3 panel square, . . . ditto,	15	08
Ditto, bead butt, ... ditto,	18	10
Ditto, 4 panel square, . . . ditto,	17	10
Ditto, bead butt, ... ditto,	20	11
If bead flush, add on the bead butt, . ditto,	01½	01
For every extra panel, add . . ditto,	01	00½
If splayed, . . add . . ditto,	01	00½

WINDOW BACKS ONLY.

Inch pine, plain key'd or framed square, per foot super.	12	07
1¼ inch ditto, ... ditto,	13	08
Ditto, moulded, or bead butt, . . . ditto,	16	10
Ditto, bead flush, ... ditto,	18	11
If circular on plan, flat sweep, once and half the price of straight from whence the article arises.		
If ditto, half inch to the foot, double ditto.		

BACKS, ELBOWS, AND SOFFITS.

	Builders' prices for all materials.	Journeymen's prices for labor only, fixing included.
Inch pine, plain keyed, . . . per foot super.	$ 11	06
1¼ inch ditto, ... ditto,	12	06½
Ditto, square framed, ... ditto,	14	07½
Ditto, moulded or bead butt, ... ditto,	18	08
Ditto, bead flush, ... ditto,	20	08½
If splayed, add . . . . . ditto,	03	02
1¼ square framed soffit, circular one edge, . . ditto,	28	12
Ditto, moulded . . . . . ditto,	32	15
Ditto, square framed, circular two edges, . . ditto,	34	16
Ditto, moulded, or bead butt, ... ditto,	37	18
If splayed add, ... ditto,	08	04
Plain circular soffit, backed on cylinder, grooved and filled in, and canvassed on the back, ditto,	50	36
Ditto, moulded, in two panels, veneered rails, ditto, ... ditto,	75	66
If flewing, add . . . . . ditto,	20	16
Capping to backs, per foot run, . . . ditto,	03	01
Ditto, to elbows, . each, . . . ditto,	06	04

BOXINGS.

Inch pine, splayed, ... per foot super.	12	06
Ditto, proper framed boxings, ... ditto,	14	08
1¼ ditto, splayed, ... ditto,	13	06
Ditto, proper framed boxings, ... ditto,	14	08
Ditto, circular on plain, flat sweep, measuring the head only, ... ditto,	30	20
Ditto, quick sweep, . ditto, . . ditto,	40	28
Ditto, semicircular head, ditto, . . ditto,	40	28
Inch boxings for sliding-shutters, including grooves, beads, fillets, &c. . . . . per foot run.	18	10
Ditto, framed head and rail . . per foot super.	12	06
If 1¼ inch, add . . . . . ditto,	02	

BOXING SHUTTERS.

Inch pine, clamped flaps, 1 height, per foot super.	15	11
1¼ inch, ditto, ... ditto,	17	12
If mortice clamped, . . add . . ditto,	03	02
1¼ inch, two panel, square framed, . . . ditto,	19	13
Ditto, bead butt or moulded and square, . . ditto,	22	14
Ditto, bead flush and square, ... ditto,	23	15

BOXING SHUTTERS, Continued.

	Builders' prices for all materials.	Journeyman's prices for labor only including fixing and hanging.
1¼ inch 2 panel bead flush or moulded, and bead butt at pack, ... ditto,	$ 25	16
If in two heights, add . . . . . ditto,	03	02
For every extra panel in height, add . . ditto,	03	02
For every ¼ inch extra thickness, add . . ditto,	03	01
If under 7 inches wide, . . add . . ditto,	03	02
For every extra flap, exceeding two on each side, add . . . . . ditto,	03	02
Small astragals or reeds mitred round panels, per foot run.	02	01½
Circular on plain, flat sweep, 1½ the straight,		
Ditto, ½ inch to the foot, double ditto.		

INSIDE SLIDING SHUTTERS, HUNG, BUT EXCLUSIVE OF THE LINES & WEIGHTS.

1¼ inch pine, 2 panel, square, . . per foot super.	13	08
Ditto, moulded, or bead butt, and square, . ditto,	16	10
Ditto, bead flush and square, ... ditto,	18	12
Ditto, moulded and bead butt, ... ditto,	20	13
If 1⅜, add from whence it arises, . . . ditto,	02	01
For every extra panel in height add . . . ditto,	03	02
If framed, one panel only, deduct, . . . ditto,	10½	01

OUTSIDE SHUTTERS, HANGING STILES INCLUDED.

1¼ inch pine, 2 panel, square, . . per foot super.	16	08
Ditto, bead butt and square, ... ditto,	17	10
Ditto, bead flush and square, ... ditto,	18	11
Ditto, 3 reeds flush and square,. . . . . ditto,	19	12
Ditto, bead flush and bead butt, . . . ditto,	22	13
Ditto, reeds flush and bead butt, . . . ditto,	23	14
If 1⅝ add from whence it arises, . . . ditto,	02	01
For every extra panel in height, add . . . ditto,	03	02
All fastenings extra.		
Circular heads to be measured from the springing, at twice and half the staight.		
Elliptical ditto, three times the straight.		

SHUTTERS FOR INSIDE OF STORES, AND STORE FRONTS.

	Builders' prices for all materials.	Journeymen's prices for labor including fixing.
1¼ pine, 2 panel square, . . per foot super.	$ 13	08
Ditto, bead butt and square, . . . ditto,	16	09
Ditto, bead flush and square, . . . ditto,	18	10
Ditto, 3 reeds flush and square, . . ditto,	19	11
Ditto, bead flush and bead butt, . . . ditto,	22	13
Ditto, bead flush, both sides, . . . ditto,	24	14
If three panels in height, . . add . ditto,	03	02
If 1⅜ inch, . . add . . . ditto,	02	01
For every extra panel in height, add. . . ditto,	03	02
Grooves to inclose shutters, . . per foot run.	06	04

Circular on plan, flat sweep, 1½ times the straight.
Ditto, ½ inch to a foot, double ditto.
Elliptical, or quick circular corners, 4 times, ditto.
Circular heads, to be measured square from the springing, 3 times, ditto.
All fastenings, iron shoes, &c. extra.

STALL BOARDS.

2½ inch pine, moulded edge, . per foot super.	30	12
Circular ditto, ... ditto,	40	18
Quirk corners to ditto, ... each	32	25
If 3 inch, . add . . per foot super.	08	03

CRADLING AND FRIEZES.

Straight, to entablature, . . per foot super.	11	07
Circular ditto, flat sweep, . . . ditto,	16	12
Ditto, . quick sweep, . . . ditto,	21	16
Ditto, . elliptical corners only, . ditto,	35	28
If grooved for tongued blockings, add . ditto,	03	02
Inch pine, straight friezes to store fronts . ditto,	13	07
Ditto, circular, flat sweep, . . . ditto,	19	12
Ditto, quick sweep, ... ditto,	25	18
Ditto, elliptical corners only, . . . ditto,	50	37
Straight mitres, ... per foot run.	12	09
Circular ditto, ... ditto,	15	12
If mahogany, instead of pine, add upon the above, per foot super.	16	03

N. B. The above are independent of the soffit, cornice, &c.

MOULDINGS.

	Builders' prices for all materials	Journeymen's prices for labor including fixing.
Common base, su base, architraves, and all other plain mouldings, girted on the face, per ft. super.	$ 18	10
Quirked ditto, ... ditto,	21	12
Circular on plan, flat sweep, . . . ditto,	32	18
Ditto, quick sweep, ... ditto,	50	25
Ditto, elliptical or sharp corners only, . ditto,	75	50
Ditto, semicircular heads not less than 4 feet opening, ... per foot super.	75	50
Ditto, under ditto, ... ditto,	87	60
Ditto, elliptical, ... ditto,	1 00	66
Reeded mouldings, in pilasters, &c. . ditto,	23	14

If any of the above be of Spanish mahogany, to be three times the above prices.

If of bay wood ditto, to be twice ditto.

COLUMNS AND PILASTERS,

EXCLUSIVE OF FIXING.

2 inch pine, diminished columns, glued and blocked, not less than 12 inches diam., per foot super.	28	16
Ditto, . from 10 to 15 inch diam. ditto,	32	18
3 inch ditto, from 15 to 20 inches diam. ditto,	35	19
1¼ inch plain pilasters, glued and blocked, ditto,	14	06
1⅝ inch ditto, ... ditto,	16	07
2 inch ditto, ... ditto,	18	08
3 inch ditto, ... ditto,	25	09
If diminished, add . . . . . ditto,	02	01
Flutes or reeds to pilasters, an inch wide or under, per foot run.	01	00¾
For every half inch in width, add . . . ditto,	00¾	00½
Flutes, or reeds to columns, as above, add ditto,	00½	00¼
Headings to inch flutes, or reeds, . . each	06	05
For every half inch in width, add . . ditto,	01½	01
Neckings to pilasters, . . . per foot run,	09	06
Ditto, to columns, ... ditto,	15	12
Caps and bases, for turning, glued in thicknesses not exceeding 3 inches, . . per foot super.	37	18
Ditto, glued upright and blocked, . . ditto,	40	25
Turning to be charged extra.		
Square block or plinth to small pilasters, . each	13	09
Panelled or sunk ditto, ... ditto,	25	18

SMALL SINGLE MOULDINGS.

	Builders' prices for all materials.	Journeymen's prices for labor only including fixing.
Pine common mouldings, from ½ inch to 1¼ inches girt, per foot run.	$ 01½	00¾
Ditto, quirked and beaded ditto, ditto,	02	01
Ditto, from 1½ inch plain to 3 inches girt, ditto,	02½	01
Ditto, quirked, ditto,	03	01¼
All above 3 inches girt to be taken at superficial measure, ditto,		
Labor to double or treble reeds, on edges of shelves, per foot run.	03	02
Plain rounded corners to shelves, each,	04	03
Reeded ditto, ditto,	08	06
Single cantalivers to shelves, ditto,	12	08
Circular, on plan, flat sweep, double,		
Quirk, ditto, 3 times,		
Ditto, to corners only, 4 times,		
Circular heads 4 times,		
Small cut brackets to shelves, ditto,	12	07
Ditto, from 9 to 12 in. wide, ditto,	18	10

FRAMED DOOR GROUNDS.

Inch pine, 4¼ wide, framed and fixed, per foot run.	07	04
Ditto, rough, the edges shot, ditto.	04	01½
Ditto, the head only, circular on plan, ditto,	12	08
1¼ framed grounds, per foot super.	14	08
Ditto, circular on plan, flat sweep, ditto,	26	16
Ditto, exceeding ½ inch to the foot, ditto,	37	25
Ditto, semicircular, head ditto,	37	25
Inch skeleton grounds for pilasters ditto,	10	06
1¼ inch ditto, ditto,	12	06
1¾ inch ditto, ditto,	16	08
If beaded ditto, add ditto,	01½	01
If under 9 inches wide, add ditto,	02	02

PLAIN DOOR JAMBS AND SOFFITS.

Inch pine, single rebated, measured across the face, per foot super.	12	06
Ditto, and beaded, ditto,	13	07
Ditto, double rebated, ditto,	14	08
Ditto, and beaded, ditto,	15	08½
1¼ ditto, single rebated, ditto,	14	06¾

PLAIN DOOR JAMBS, &c. — Continued.	Builders' prices for all materials.	Journeymen's prices for labor including fixing.
Ditto, 1¼ single rebated and beaded, . ditto,	$ 14½	97
Ditto, double rebated, ... ditto,	15	07½
1⅜, single rebated, ... ditto,	15½	08
Ditto, and beaded, ... ditto,	16	08½
Ditto, double rebated, ... ditto,	17	09
Ditto, and beaded, ... ditto,	18	10
If reeded, . . . add . . ditto,	01¼	01
If the head be circular on one edge, to be double the straight.		
If circular on two edges, to be 3 times ditto.		

FRAMED DOOR JAMBS AND SOFFITS.

1¼ inch pine, one panel square, double rebated, per foot super.	15	08
Ditto, moulded, or bead and flush, . . ditto,	18½	01
1⅜ inch, one panel square, ditto, . . ditto,	17½	09
Ditto, moulded, or bead and flush, . . ditto,	20	11
If beaded, add for each edge, . . ditto,	01¼	01
Ditto, on the circular part, ... ditto,	02½	02
If circular on one edge only, to be double the straight of the head only.		
If circular on both edges, 3 times ditto.		
Semicircular heads plain, glued in thicknesses, 4 times.		
Ditto, framed and moulded, . . . 6 times.		
Ditto, ditto, flewing, . . . 8 times.		
N. B. The above articles to be back rebated to receive the grounds.		

MOULDED ARCHITRAVES & PILASTERS.

Double faced and double moulded architraves, per foot super.	15	09
Ditto, ditto, common width, . per foot run.	12½	06
Ditto, with plain sunk and moulded face, ditto,	10	05
Single moulded architraves, ... ditto,	06½	03½
Quirk-moulded pilasters, . . . per foot super.	17	11
Ditto, and sunk flat in centre, . . ditto,	14	09
Moulded pilasters with blocks, plinths, and tablet complete, ... per foot run.	14	08
Carved enrichments to blocks and tablet, per set,	1 00	

FRAMED CUPBOARD DOORS & FRAMES.

	Builders' prices for all materials.	Journeymen's prices for labor including fitting and hanging.
1¼ inch pine, 1 panel square, . per foot super.	$ 16	09
Ditto bead butt, or moulded and square, . ditto,	19	11
Ditto, ditto both sides, ... ditto,	22	13
If Baywood mahogany, . add . ditto,	15	03
If Spanish ditto, . add . ditto,	25	06
If hung folding, . . add . ditto,	03	02

If less than 3 feet super, add ¼ to the above prices.

INCH AND QUARTER DOORS.

Two panel pine, square, . . per foot super.	12	05
Ditto, folding, ... ditto,	13	06
Ditto, bead butt, or moulded and square, . ditto,	14	06
Four panel, square, . . . ditto,	13	05½
Ditto, bead butt, or moulded and square, . ditto,	14½	06¼
Ditto, both sides, ... ditto,	15½	06½
If hung folding, . . . add . ditto,	02	01

INCH AND THREE-EIGHTH DOORS.

Two panel, square, . . . per foot super.	14½	05
Ditto, folding, ... ditto,	16	06
Four panel, square, ... ditto,	16	06
Six panel, ditto, ... ditto,	16½	06¼
Two panel, bead butt, or moulded and square, ditto,	17	06½
Four panel ditto, ... ditto,	17½	06¾
Six panel, ditto, ... ditto,	18	06¾
Two panel, bead butt, or moulded, both sides, ditto,	18	07
Four panel . ditto, ... ditto,	18½	07
Six panel . ditto, ... ditto,	19	07¼
Two panel, bead flush and square, . . ditto,	18	07
Four panel ditto, ... ditto,	18½	07½
Six panel ditto, ... ditto,	19	08
Two panel, bead flush, 2 sides, . . . ditto,	19	08
Four panel ditto, ... ditto,	19½	08½
Six panel ditto, ... ditto,	20	09
Two panel, skeleton doors, ... ditto,	10	04
Four panel ditto, ... ditto,	10½	04
Six panel ditto, ... ditto,	11	04½
Four panel, flush one side, for covering, . ditto,	15	05
Ditto, flush both sides, . . . ditto,	16	06

INCH AND THREE-QUARTER DOORS.

	Builders' prices for all materials.	Journeymen's prices for labor including fitting and hanging.
Two panel, square, . . . per ft. super.	$ 15½	$ 05½
Four panel, ditto, ... ditto,	16	05¾
Six panel, ditto, ... ditto,	16½	06
Two panel, bead butt, or moulded, and square, ditto,	18	06½
Four panel, . ditto, . . . ditto,	18½	06¾
Six panel, . ditto, . . . ditto,	19½	07
Two panel, . ditto, 2 sides, . ditto,	20	07
Four panel, . ditto, . . . ditto,	20½	07½
Six panel, . ditto, . . . ditto,	21	08
Two panel, bead flush, and square. . ditto,	18½	07
Four panel, . ditto, . . . ditto,	19½	07½
Six panel, . ditto, . . . ditto,	20½	07¾
Two panel, . ditto, 2 sides . ditto,	21	08
Four panel, . ditto, . . . ditto,	22	08½
Six panel, . ditto, . . . ditto,	23	09
Two panel, blank door, moulded, and rough, ditto,	15	05½
Four panel, . diito, . . . ditto,	15½	05¾
Six panel, . ditto, . . . ditto,	16	06
If with double margins, add . . . ditto,	02	01
If hung folding, add, ... ditto,	01½	01
Raised panels, upon the price of the article from whence it arises, extra, . . ditto,	01½	01

TWO AND A QUARTER INCH DOORS.

Four panel, . square, . per ft. super.	22½	08
Six panel, . ditto, . . . ditto,	23¾	09
Four panel, beat butt, moulded and square, ditto,	25	10
Six panel, . ditto, . . . ditto,	26¼	11
Four panel, . ditto, 2 sides, . . ditto,	27½	12
Six panel, . ditto, . . . ditto,	28¾	13
Four panel, bead flush, and square, . . ditto,	26¼	11
Six panel, . ditto, . . . ditto,	26¼	11
Four panel, . ditto, 2 sides, . . ditto,	27½	12
Six panel, . ditto, . . . ditto,	28¾	13
Ditto, with double margins, or hung folding, ditto,	30	14
Four panel, moulded blank door, . . . ditto,	23¾	09
Six panel, . ditto, . . . ditto,	25	10
Four panel, quirk O. G. and bead, 2 sides, ditto,	26¼	11
Six panel, . ditto, . . . ditto,	27½	12
Ditto, double margin, or hung folding, . . ditto,	28¾	13
Eight panel, . ditto, . . . ditto,	30	14
Ditto, double margin, or hung folding, . . ditto,	31¼	15
Four panel, fancy moulding both sides, 6 inch margins, ... ditto,	31	14
Ditto, double margin, or hung folding, . . ditto,	31½	15
Six or eight panel, ditto, . . . ditto,	32	15
Ditto, double margin, or hung folding, . . ditto,	33	16

EXTERNAL OR FANCY DOORS.	Builders' prices for all materials.	Journeymen's prices for labor, including fixing and hanging.
2½ inch pine, 2 pannel, large moulding and bead butt back, ... per ft. super.	$ 30	13
Ditto, and bead flush back, 6 inch margins, ditto,	31¼	14
Ditto, 3 panel, . ditto, . . ditto,	32	14½
Ditto, 4 panel, . ditto, . . ditto,	32½	15
Ditto, 6 panel, . ditto, . . ditto,	33¾	16
Ditto, 8 panel, . ditto, . . ditto,	35	17
If bolection, or other large projection moulding, add . . . . . ditto,	02	01½
If 3 inch doors, . add, . . ditto,	04	02
If double margin, . add, . . ditto,	02	01
If hung folding, . add, . . ditto,	01½	01
When any of the foregoing doors are circular on the plan, flat sweep, to be 1½ times the price of straight.		
Ditto, exceeding ½ inch to the foot, twice ditto.		
Circular heads to be measured from the springing, as square, at three times the price of straight.		

INCH AND THREE-EIGHTHS SASH DOORS.					
Two panel, square lower part, and ovolo sash at top,				per foot super.	16¼	08
Ditto, bead butt, and square		ditto,	.	ditto,	17½	09
Ditto, bead flush, and square		ditto,	.	ditto,	18¾	10
Ditto, moulded and square		ditto,	.	ditto,	17½	09
Ditto, moulded both sides		ditto,	.	ditto,	18¾	10
If diminished stiles,	add	.	.	ditto,	02¼	02
If 1¾ inch, . .	add	.	.	ditto,	02	01
If made and hung folding,	add	.	.	ditto,	02	01
If of baywood mahogany,	add	.	.	ditto,	12	03
If of Spanish ditto,	add	.	.	ditto,	18	06

MAHOGANY DOORS.					
1¾ inch, 4 panel baywood, moulded both sides, 5½ in. margins, ... per foot super.					75	30
Ditto, with 6 inch margins, ... ditto,					87	32
Ditto, of Spanish mahogany,		ditto,	.	. ditto,	1 00	35
Ditto, blank doors, . .		ditto,	.	. ditto,	85	23
Ditto, with double margins, .		ditto,	.	. ditto,	1 12	36
Ditto, blank doors, . .		ditto,	.	. ditto,	90	25
Ditto, hung folding, . .		ditto,	.	. ditto,	1 18	37

MAHOGANY DOORS. Continued.

	Builders' prices for all materials.	Journeymen's prices for labor, including fitting and hanging.
2¼ inch, baywood, 4 panel, moulded both sides, with 6 inch margins, . . . ditto,	1 00	34
Ditto, blank doors, . . ditto, . ditto,	85	25
Ditto, 6 panel, . . . ditto, . ditto,	1 12	36
Ditto, blank, . . . ditto, . ditto,	90	26
Ditto, 8 panel, . . ditto, . ditto,	1 20	38
Ditto, blank, . . . ditto, . ditto,	95	27
Ditto, large folding doors, . ditto, . ditto,	1 00	33
Ditto, of Spanish, . . ditto, . ditto,	1 15	36
If panels veneered, charge extra . . ditto,	18	06
If raised panels, . add . . ditto,	25	12
Circular on plan, flat sweep, 1½ times the straight.		
Ditto, quick sweep, double price.		
Ditto, exceeding ½ inch to the foot, 2½ times the straight.		

STORE, OR WAREHOUSE DOORS.

2½ inch, 8 panel, in two thicknesses, screwed together, bead and flush one side, moulded the other, per foot super.	40	20
2½ sash door, 2 panel, ditto, with diminished stiles moveable shutter in top of one side, and sash made in the other, with shutter lifts, stubs, plates, and thumb screws, per foot super.	56	30
Ditto, large size, hung folding, ditto, . ditto.	60	32
Charge the glass at per light extra.		

LEDGED DOORS.

Inch pine, matched and beaded, with inch chamfered ledges, ... per foot super.	12	05
1¼ inch ditto, with ledges and braces, . ditto,	14	05½
Ditto, with narrow boards, equal margins, ditto,	17	06
Ditto, hung folding, ... ditto,	18	06½
If 1⅜ inch, add, ... ditto,	02	01
Inch pine, ditto, in two thicknesses, crossing each other, ... ditto,	18	06
1¼ inch ditto, ... ditto,	22	07
If in two heights, . . add . . ditto,	01½	01
If in cellar flaps, . . add . . ditto,	01½	01
If 1⅜ inch ditto, . . add . . ditto,	02	01

FRAMED COACH-HOUSE GATES AND DOORS.	Builders' prices for all materials.	Journeymen's prices for labor including fitting and hanging.
1¾ pine framed and braced, filled in on front with inch matched and beaded boards 4 in. to 5 in. wide, per foot super.	$ 24	12
2¼ ditto, with 1⅜ framed rails and braces, filled in on front with inch narrow boards, matched and beaded, ... per foot super.	30	14
If 3 inch, add . . . . . ditto,	03	01
2¼ framed bead flush and square gates, in 8 panels, ... ditto,	28	12
Ditto, in 12 panels, ... ditto,	29	13
Ditto, in 16 panels, ... ditto,	30	14
If 3 inch, add, ... ditto,	03	01
If hung folding, add . . . . . ditto,	02	01
If any of the above are framed with a wicket, add upon the whole face, ... ditto,	03	02
Moulded cap rail grooved for the top rail, per ft. run.	25	12
PALISADO GATES.		
1¾ inch pine, the lower part bead and flush, the upper part filled in with palisades to answer to fence, per foot super.	28	16
2¼ Ditto, the lower part bead and flush, the upper part filled with bars, . . . per foot super.	32	18
WAINSCOTING.		
1¼ inch pine, square, framed to ceiling, per foot super.	12	05
Ditto, moulded, or beat butt, ... ditto,	15	07
Ditto, bead flush, ... ditto,	16¼	08
If more than 2 panels high, add . . . ditto,	01½	01
1¼ inch dwarf, square framed, . . . ditto,	13¾	06
Ditto, moulded, or bead butt, . . . ditto,	16¼	08
Ditto, bead flush, ... ditto,	17½	09
If framed 2 panels high, add . . . . ditto,	01½	01
Ditto, raking to stairs, add . . . . ditto,	03½	02
Beaded cappings to ditto, ... ditto,	02	01
Moulded ditto, ... ditto,	03½	02

PARTITIONS.

	Builders' prices for all materials.	Journeymen's prices for labor only including fixing.
1¼ inch, square framed, ... per ft. sup.	$ 13	06
1¾ inch ditto, ... ditto,	16¼	07
Ditto, bead butt, or moulded and square ditto,	18¾	09
Ditto, bead flush and square, ... ditto,	20	10
Ditto, moulded both sides . . . . ditto,	21	11
1¾ square framed, ... ditto,	18½	08
Ditto, bead butt, or moulded and square ditto,	21¼	10
Ditto, bead flush and square, ... ditto,	22½	11
Ditto, moulded both sides, ... ditto,	23¾	12
Ditto, bead flush both sides, ... ditto,	25	13
If 2¼ inch, add . . . . . ditto,	02½	01
Square skirting and fascia to be taken at one side only, at . . . . . per foot run.	03	01½

Circular on plan, flat sweep, 1½ times the straight.
Quick sweep, double ditto.
Sharp corners, 3 times ditto.

COUNTERS.

Inch pine tops, blocked to frame, per foot super.	12	06
1¼ ditto, ... ditto,	13¾	06
Tongued clamps, ... per foot run.	11	08
Morticed ditto, ... ditto,	13	10
Mitres to the top, ... each,	17	14
Fitting and hanging each flap, . . .	28	20
Inch baywood mahogany top, . . . per ft. sup.	32	10
Ditto, Spanish ditto, ... ditto,	50	14
Mortice clamps to ditto, ... per ft. run.	30	16
Mitres to ditto, ... each,	25	18
Fitting and hanging flaps, ... ditto,	45	35
Tongued headed joints, ... per ft run.	18	12
Circular cut edge, ... ditto,	06	04
1¼ inch pine fronts framed square, per ft. sup.	12	06
Ditto, moulded, ... ditto,	16¼	08
Ditto, baywood malmogany, ditto, . . ditto,	40	14

Circular on plan, flat sweep, 1½ times the straight.
Ditto, quick sweep, twice ditto,
Ditto, sharp corners, three times ditto.

DRESSERS.	Builders' prices for all materials	Journeymen's prices for labor including fixing.
1⅜ pine dresser, top planed both sides, per ft. super.	8 15	07
1¾ inch ditto, ... ditto,	18¾	08
2¼ inch ditto, ... ditto,	22½	09
3 inch ditto, ... ditto,	27	10
2 inch square framed and beaded legs, per ft. run.	11	06
2½ inch ditto, ... ditto,	12	07
3 inch ditto, ... ditto,	13	08
4 inch ditto, ... ditto,	14	09
Inch pot board and bearers, . per ft. super,	10	04
1¼ inch ditto, ... ditto	12½	05
Framed rails, 4½ by 1⅜ . . . . ditto,	12	07
Ditto 8 by 1¾ . . . . . ditto,	14	08

IRONING BOARDS, OR FALLING LEAVES.		
1¼ inch pine, clamped ends, and hung with hinges, including hanging-stile & fixing, per foot super.	16	08
1⅜ inch, . . ditto, . . . ditto,	18	08½
1¾ inch, . . ditto, . . . ditto,	21	09
2¼ inch, . . ditto, . . . ditto,	22	9½

DRAWERS.		
½ or ⅝ inch pine, dovetailed in sides of drawers, per foot super.	12	06
Ditto, Cedar, ... ditto,	16	07
Ditto, baywood mahogany, ... ditto,	25	08
Inch pine, ditto, ... ditto,	12½	06½
1¼ inch, ditto, ... ditto,	15	07
Inch pine, dovetailed in drawer fronts, ditto,	15	08
1¾ inch, ditto, ... ditto,	16½	08½
1⅜ inch, ditto, ... ditto,	18½	09
½ or ⅝ inch pine, in drawer bottoms, blocked, ditto,	11	05
1¼ pine rebated runners to drawers . . ditto,	06	03
Ditto, oak or mahogany ditto, . . . ditto,	09	04

SHELVES.	Builder's prices for all materials.	Journeymen's prices for labor, including fixing.
Inch pine shelves, prepared and fixed, per foot super.	s 10	04
Ditto, with astragal edge, . . . ditto,	11¼	05
1¼ inch ditto, and cut standards . . ditto,	13¾	06
Ditto, with moulded edge, . . . ditto,	15	07
1⅜ ditto shelves and cut standards, . . ditto,	16¼	07
Cross grooves, ... ditto,	01¼	01
Cut brackets, small, ... ditto,	08	04
Ditto, large, ... ditto,	12	06
½, ¾, or inch, matched and beaded linings to backs of shelves, ... per foot super.	10	04
Ditto, beaded fascia, ... ditto,	11¼	05
Inch shelves in closets fixed on ledges . ditto,	10½	04½
1¼ inch ditto, ... ditto,	12½	05
WASHING TROUGHS.		
1⅜ inch pine, wrought, splayed, and nailed together, with white lead in the joints, per foot super.	18	08
1¾ inch ditto, ... ditto,	22	09
CISTERNS AND SINKS.		
1¼ inch pine, planed two sides and dovetailed, per foot super.	12	05
1⅜ inch, . ditto, ... ditto,	15	06
1¾ inch, . ditto, ... ditto,	18¾	07
2¼ inch, . ditto, ... ditto,	21¼	08
1¼ inch proper ledged flaps and frames to cisterns,	14	06
1⅜ inch, . ditto, ... ditto,	16½	07
1¼ inch, planed one side bottom and bearers ditto,	11¼	04
1⅜ inch, . ditto, ... ditto,	13¾	05
WATER CLOSETS.		
1¼ inch pine, seat and riser, with bearers, per foot super.	12½	05
Ditto, framed and beaded top, with clamped flap, ditto,	15	07

	Builders' prices for all materials.	Journeymen's prices for labor including fixing.
WATER CLOSETS.—Continued.		
Inch baywood mahogany, seat riser, and bearers, ditto,	$ 35	12
Ditto framed and beaded top with clamped flap, ditto,	45	18
If Spanish mahogany, add . . ditto,	15	03
Rounded nosing, ... per foot run,	05	04
Moulded ditto, ... ditto,	10	08
½ inch mahogany square skirting on seat, per foot run,	12	04
Cutting and dressing holes in pine seat, . each,	18	14
Ditto, in mahogany, ... ditto,	23	18
Ditto, for brass pull, with bead mitred round, ditto,	35	28
Casting to pipes or wires, . . per foot super.	14	08
PLAIN DOOR AND WINDOW LININGS.		
Inch pine, plain, rounded one edge and tongued into frame . . . . . per foot super.	10	04
1¼ inch ditto, with return bead and grooved for plaster, ... ditto,	12½	05
Ditto plain rounded window boards and bearers, ditto,	12½	05
STAIRCASES.		
1¼ clean pine steps, ⅞ risers, and carriages with moulded nosings to close string, per foot super.	15	06
1⅜ inch ditto steps 1¼ risers, and ditto, . ditto,	17½	07
1¼ steps, ⅞ risers, mited to string board, and dovetailed for ballusters, glued and tongued ditto,	22½	12
Ditto, with one circular end, . . . ditto,	30	18
Ditto, with both ends circular, . . ditto,	39	25
If winders, add, from whence they arise, ditto,	06	03
If of mahogany, add, ... ditto,	30	12
1¼ rough steps, ⅞ risers and carriages with close string ditto,	12	05
1⅜ ditto, ... ditto,	15	06
1¾ ditto, ... ditto,	18¾	07
2¼ ditto, ... ditto,	21½	08
Quarter curtail, glued upright, . . each,	12	75
Circular veneer to riser of ditto, per foot run,	35	25
Circular hollow ditto to ditto, . . ditto,	18	12
Returned moulded nosings, . . . each,	16	12
Ditto, circular, ... ditto,	35	25

STAIRCASES. — Continued.

	Builders' prices for all materials.	Journeymen's prices for labor including fixing.
Plain cut bracket, ... each,	$ 16	12
Circular ditto cut out of lead, . . ditto,	37	25
Housings to step and riser, glued and wedged to strings, ... each end,	07½	06
Ditto to winders, ... ditto,	10	08
Ditto, to circular ends, ... ditto,	12½	10
1¼ inch square framed spandrill framing, per foot super.	16¼	08
Ditto, moulded, or bead butt, . . . ditto,	19	10
1⅜ ditto, ... ditto,	19	09
Ditto, with sash in upper part — price for sash part, ditto,	25	12
1¼ plain wall string, ... ditto,	13⅜	06
1⅜ inch ditto, ... ditto,	16¼	07
1¾ inch ditto, ... ditto,	20	08
If moulded, . . add, ... ditto,	03½	02
1¼ inch plain wreathed, ... ditto,	40	25
1⅜ ditto, ... ditto,	42	26
1¾ ditto, ... ditto,	45	27
If moulded, . . add . . . ditto,	10	08
If used as outside string, add . . . ditto,	04	03
1¼ inch plain string board, framed, rebated, and beaded, ... per foot super.	17	08
Ditto, sunk and beaded, ... ditto,	20	10
Ditto, and moulded, ... ditto,	22½	12
Ditto, and mitred to risers, . . . ditto,	25	14
If double sunk, . add, . . . ditto,	02½	02
1¼ inch level circular fascia, glued upright, ditto,	54	37
Ditto, with sunk face, ... ditto,	65	45
Ditto, and moulded, ... ditto,	70	50
Ditto, solid wreathed, glued upright, . ditto,	1 00	75
Ditto, sunk, ... ditto,	1 10	81
Ditto, moulded, ... ditto,	1 18	87
Do. veneer wreathed and backed on cylinder, ditto,	1 20	87
Ditto, sunk and moulded in thicknesses, . ditto,	1 40	1 00
If double sunk, . add, . . . ditto,	15	12
If any of the above are to a less opening than 6 inches, clear, add for every inch under that dimension, for the plain circular, . . . ditto,	12	06
Ditto, on the sunk and moulded, ditto, . ditto,	18	12
Plain circular cuttings, or ramps, to wall strings, per foot run,	04	03
Moulded ditto, ... ditto,	07½	06
If rebated to form a ground, . . . ditto,	02½	02
Ditto on the circular. . . . . ditto,	05	04

HAND RAILS AND BALUSTERS.

	Builders' prices for all materials.	Journeymen's prices for labor, including fixing.
Pine rounded rail, straight, . . per foot run,	$ 12	06
Ditto, moulded, ... ditto,	15	08
Rounded ditto, ramped, ... ditto,	37	24
Moulded ditto, ... ditto,	47	32
Rounded ditto, level circular, . . . ditto,	42	28
Moulded ditto, ... ditto,	54	37
Rounded ditto, wreathed, ... ditto,	75	48
Moulded ditto, ... ditto,	92	64
Baywood mahogany rounded rail, 2½ in. by 2½ in. ditto,	24	10
Moulded ditto, ... ditto,	31	15
Rounded ditto, ramped, ... ditto,	56	30
Moulded ditto, ... ditto,	75	45
Rounded ditto, level circular, . . . ditto,	75	40
Moulded ditto, ... ditto,	92	60
Rounded ditto, wreathed, ... ditto,	1 25	80
Moulded ditto, ... ditto,	1 50	1 20
Scroll or twist, to curtail of rounded rail, ditto,	1 37	1 00
Ditto to moulded rail, ... ditto,	2 00	1 50
Extra sinking for iron rails, ... ditto,	05	04
Ditto on the circular, ... ditto,	10	08
Ditto on the wreathed, ... ditto,	15	12
For every inch under twelve inch opening in the wreathed rails, add . . ditto,	18	12
All rails to be measured in the centre on the top, and three inches beyond the springing of the sweep.		
Square pine balusters, 1⅜ by ⅞, dove-tailed to steps. ditto,	05	03
Ditto mahogany, . . . ditto, ditto,	10	06
Turnings to balusters, ... each,	25	
Square framed newel, 3 by 3, of pine, per foot run,	15	06
Single turnings to ditto, ... each,	20	
Double ditto, ... ditto,	30	
Framed mahogany newel, 4 by 4, exclusive of turning, ... per foot run,	37	12
Ditto, ... 5 by 5, . ditto,	58	15
Ditto, ... 6 by 6, . ditto,	82	18
Mahogany mitre caps, ... each,	30	18
Pine ditto, ... dttto,	18	12
Joint screws and butt joints, each.	1 00	25

Half rail to be two-thirds the price of a whole rail.

The above detail prices are given to enable persons to arrive at the correct value of stairs, of any form or dimensions; but, for common purposes, the following list, with the price at per step and riser, will save much trouble in calculation.

PRICES OF STAIRS,

AT PER STEP.

	Builders' prices for all materials.	Journeymen's prices for labor, including fixing
Pine cellar stairs, with close string, pine rail, newels, and balusters, ... at per step,	$1 25	50
Common garret stairs, including rough plank partition on one side, ... at per step,	87½	30
Stairs, from 2 ft. 6 in. to 2 ft. 9 in. long, of 1¼ in. pine steps, with rounded nosings, and ⅞ in. risers, housed and wedged into strings, 1¼ in. close capped and beaded strings framed into, newels, 1¼ in. wall-strings with ramped and raking torus moulding on top; pine turned newels and bar balusters; pine rounded rail with turned and mitred caps, at per step and riser.	1 75	1 00
Ditto, with mahogany turned newels, rounded rail and turned balusters, ... ditto,	2 00	1 12
Ditto, between partitions, with half rail on each side, without balusters, . . per step and riser,	1 75	1 00
Ditto, with open, moulded and wreathed string, to 5 inch well hole, the wreath glued upright, and mitred to risers; moulded and returned nosings to stops; 5 inch mahogany turned, and carved newel at bottom; mahogany rounded and continued rail, with turned balusters dovetailed to steps, and cut brackets to ends; ramped and continued base moulding fixed on wall string, at per step and riser,	3 50	1 50
If with curtail veneered at bottom, and scroll to rail, instead of newel, ... add extra,	5 00	3 00
Ditto, of clean yellow pine steps and risers, moulded and returned nosings; open moulded and wreathed string to 8 inch well hole, the wreath veneered and backed on cylinder, and mitred to risers; 6 inch mahogany, carved newel at bottom; large Spanish mahogany, moulded and continued rail, mahogany turned and carved balusters dovetailed to steps, and fancy cut brackets to ends; large ramped and continued base moulding on double face wall string, with strong carriage pieces bracketed under steps, . . at per step and riser	5 00	2 00
If with curtail step at bottom and large scroll to rail, instead of newel, . . . add extra.	9 00	5 00

The above prices are for the stairs only, exclusive of spandrill or other inclosure framing.

Stairs, circular on the plan, double price.

Ditto, oval, ditto, 2½ times for the quick part.

The mahogany rail and balusters are separately worth about one-third the price of the whole stairs.

	Builders' prices for all materials.	Journeymen's prices for labor, including fixing
FENCING AND PAILINGS.		
Common pale fence, with pales 3 inches wide and about 4 feet high, cedar posts, and moulding on top, ... per foot run,	$ 75	15
Ditto, with chesnut posts, . . ditto,	62	12
Ditto, . . ditto, and pointed pales, ditto,	50	9
Baluster fence, the rails, balusters, and posts square, with 1¼ inch plank bottom rail, . ditto,	1 50	38
Ditto, the posts panelled in front, with moulded cap and urn on top, turned and pointed baluster, moulded rails, and 1¼ inch plank bottom rail, per foot run,	2 25	50
Inch pine, board fence, planed both sides, grooved and tongued, and picquted on top with posts hewed planed, and fixed up, . per square,	5 25	2 00
Ditto, the boards rough, grooved and tongued, ditto,	4 25	1 50
Ditto, the boards fixed horizontally, planed and lapped, on chesnut posts, ... ditto,	3 75	1 00
Ditto, the boards rough, ... ditto,	3 00	75
1¼ inch plain lattice work, in beaded frame and moulded capping, ... ditto,	6 00	1 50
INCLINED CELLAR DOORS.		
Inch planed, matched, beaded, and ledged cellar doors, 4 feet square, hung folding on 1¼ inch matched and beaded cheeks, with hinges, bar, and lock complete, ...	11 00	2 75
Ditto, hung single, ...	10 00	2 50
STABLING.		
Inch pine, wrought one side, tongued and beaded linings to walls, . . per foot super,	10	4
Ditto, wrought two sides, tongued, and glued to arches over heel posts, ... ditto,	12	6
If 1¼ inch, ditto, add . . . ditto,	3	1
1¼ inch, wrought two sides, tongued and beaded, joints, and dovetailed corn bins, . ditto,	12	5
1¼ inch pine, wrought two sides for managers, ditto,	15	6
Two inch ditto, ... ditto,	18	7
Ditto, planed two sides, and chamfered wheelboard, ditto,	18	7

STABLING. — Continued.

		Builders' prices for all materials	Journeymen's prices for labor including fixing.
Two inch, ploughed, tongued, and beaded divisions between stalls,	ditto,	$ 21	9
1½ inch litter board, with rounded edge,	ditto,	11	3
Circular rims to racks, in two thicknesses	per foot run,	15	8
Arris seed bars at bottom of hay racks,	ditto,	4	2
Grooved and rounded cap rail to front of mangers,	ditto,	9	4
Ditto, top rail to stall divisions, framed into posts,	ditto,	12	6
Ditto, ramped,	ditto,	24	12
Pine rack staves, 2½ inches diameter,	ditto,	9	3
Rail for harness pins,	ditto,	10	6
Harness pins eight inches long,	each,	12	8
Bar to coach house doors,	per foot run,	8	4

FIXING ON IRONMONGERY.

LABOR ONLY.

Fitting on and fixing butts on shutters, &c.		per pair,	7½	6
Ditto,	on doors,	ditto,	12	9
Ditto,	sash fastenings,	ditto,	15	12
Ditto,	dead locks,	each,	7½	6
Ditto,	6 or 7 inch iron rim ditto,	ditto,	12	10
Ditto,	mortice locks,	ditto,	25	20
Ditto,	front door locks,	ditto,	20	16
Ditto,	common bolts,	ditto,	5	4
Ditto,	3 to 6 inch flush bolts,	ditto,	7½	6
Ditto,	6 to 9 inch ditto,	ditto,	10	8
Ditto,	for every 3 inches above 9, add	ditto,	2½	2

PRICES OF DOORS HUNG AND TRIMMED COMPLETE.

Calculation of a 4 pannel 1⅜ inch door, moulded both sides, 7 ft. 4 in. high, by 3 ft. wide, hung with 3 inch butts, and a 7 in. iron rim lock, in 1¼ inch rebated jambs, fixed to rough grounds, with moulded architraves on each side complete.

Ft.	In.	Ft.	In.		At per foot.	Builders' prices for all materials.	At per foot.	Journeymen's prices for labor only
7	4				cts.	$ cts.	cts.	$ cts.
3	0	22	0	Super. of 1⅜ in. 4 panel door moulded both sides,	18½	4 7	7	1 54
17	10							
	7	10	5	Super. of 1¼ in. rebated jambs,	14	1 46	6½	68
2)18	0	36	0	Run. of rough grounds,	4	1 44	1½	54
2)19	9	39	6	Ditto of single moulded architraves,	6½	3 56	3½	1 38
				1 pair of 3 inch butts and screws, fixed,		29		9
				One 7 inch iron rim lock fixed,		2 12		10
						12 94		4 33
1⅜ inch doors, 7 ft. by 2 ft. 10 in. trimming complete as above,						11 38		4 10
1⅜ inch doors, 6 ft. 9 in. by 2 ft. 8 in. trimmed complete as above,						10 90		3 87

Calculation for a 6 or 8 panel 1¾ inch door, moulded both sides, 8 feet high, by 3 feet 6 inches wide, hung with a pair of patent butts, 4 inches by 3 inches, and a (Day's) mortice lock, in 1¼ inch double rebated jambs 8 inches wide, fixed to rough grounds, with moulded pilasters, blocks, plinths, and tablet, on each side; the blocks and tablet carved, and all fixed complete.

Ft.	In.	Ft.	In.		At per foot.	Builders' prices for all materials.	At per foot.	Journeymen's prices for labor only.
					cts.	$ cts.	cts.	$ cts.
8	0							
3	6	28	0	Super. of 1¾ door, as above,	20	5 60	7	1 96
20	0							
	8	13	4	Super. of 1¼ double rebated jambs,	15	2 00	7½	1 00
2)20	8	41	4	Run. of rough grounds,	4	1 65	1½	62
2)21	6	43	0	Ditto, of moulded pilasters, blocks, and tablet,	14	6 02	8	3 44
				Carving to ditto,		1 00		
				1 pair of patent butts, 4 in. by 3 in. and screws,		68		9
				1 mortice lock (Day's) fixed,		4 50		20
						21 45		7 31
				1¾ inch doors, 7 ft. 9 in. by 3 ft. 4 in. trimmed as above, complete,		19 75		7 00
				1¾ inch doors, 7 ft. 6 in. by 3 ft. trimmed as above, complete,		18 00		6 75
				1¾ inch doors, 7 feet. 4 in. by 2 feet 10 in. trimmed as above, complete,		16 80		6 50

PRICES OF WINDOWS TRIMMED AND FINISHED COMPLETE.

Calculation for a window of 12 lights, 11 inches by 16 inches of $1\frac{3}{8}$ inches ovolo sashes double hung in cased frame, and moulded pilasters with panelled blocks; $1\frac{1}{4}$ inch moulded back, elbows, and soffit; beaded capping on back, and elbow caps; $1\frac{1}{4}$ inches bead butt and moulded shutters in four folds, hung in two heights; all fixed complete.

Ft.	In.	Ft.	In.		Price per foot.	Builders' prices for all materials.	Price per foot.	Journeymen's prices for labor only.
					Cts.	$ cts.	Cts.	$ cts.
6	4							
3	11	24	9	Super of sash frame, fixed at	13	3 21	5	1 24
				12 lights of ovolo glazed sashes 16 by 11,	38	4 56	8	96
				Fitting and hanging ditto, including lines,		65		37
				22 pounds of sash weights,	3	66		
2) 6	2			Super. of plain tongued				
	$11\frac{1}{2}$	11	10	backlinings,	10	1 18	5	59
				Ditto, of moulded pilasters,	21	4 71	12	2 70
length 22	6							
girt 1	0	22	6	Extra for two angle blocks to ditto,		25		
				Super. of moulded back				
5	2			and elbows,	18	2 34	10	1 30
2	6	12	11	Run of beaded capping,				
				on back,	2	$6\frac{1}{2}$	1	$3\frac{1}{2}$
		8	3	2 elbow caps,	6	12	4	8
				Super. of framed and				
3	$10\frac{1}{2}$			moulded soffit,	18	63	8	28
	11	3	6	Ditto, of moulded and				
				beadbutt shutters,	28	5 32	18	3 42
5	10			4 pair of butts, and 4				
3	3	19	0	pair of flaps and screws,	18	1 46	6	48
				2 hooks and eyes, fixed on,	6	12	2	4
				1 sash fastening do.		31		12
						$25 58$\frac{1}{2}$		$11 61$\frac{1}{2}$

	In. In.	Builders' prices for all materials.	Journeymen's prices for labor only.
		$ cts.	$ cts.
Windows, trimmed as before, the lights	14 by 10 each,	20 35	9 25
Ditto, . . ditto, . .	12 by 10 ditto,	17 50	8 62
Ditto, . . ditto, . .	10 by 8 ditto,	16 75	7 80
Windows trimmed as above, with 1¼ inch ovolo sashes, the lights,	22 by 14 each,	39 28	15 58
Ditto, . . ditto, . .	20 by 12 ditto,	33 25	13 68
Ditto, . . ditto, . .	18 by 12 ditto,	29 75	12 81
Ditto, . . ditto, . .	16 by 11 ditto,	26 25	11 75
Ditto, . . ditto, . .	14 by 10 ditto,	20 62	9 30
Ditto, . . ditto, . .	12 by 10 ditto,	17 85	8 65

In the above prices, it will be perceived that the *making* of the sashes is reckoned in with the journeymen's prices; when the sashes are made by another person, the price of making, viz. 7 or 8 cents per light, must be deducted from the above.

DORMER WINDOWS, TRIMMED AND FINISHED COMPLETE.	Builders' prices for all materials.	Journeymen's prices for labor only.
	$ cts.	$ cts.
Front dormer windows with circular or pediment heads, moulded pilasters with caps and bases, moulded imposts, and cornice; cased frame with 9 lights, 14 inch by 10 inch, double hung; the roof shingled and the sides clapboarded, each	30 00	8 00
Ditto, with square head, trimmed as above, the sides and roof planked for slating, . . .	27 00	7 00
Plain dormers of the above size for rear windows,	19 75	6 00
CHIMNEY PIECES, FIXED COMPLETE.		
Chimney pieces, with Grecian Ionic fluted columns, with caps and bases, recessed or ornamented panel or tablet in frieze, moulded shelf and cornice, ...	15 00	6 25
Ditto, . ditto, with plain columns and Doric caps,	10 00	4 25
Ditto, with moulded pilasters, caps and bases,	9 00	4 00
Ditto, plain without tablet, ...	8 00	3 50
Ditto, common for kitchens, &c. . . .	4 00	1 50
Ditto, plain board and shelf only, for ditto, .	2 00	1 00

STOOPS TO DOORWAYS.

	Builders' prices for all materials.	Journeymen's prices for labor only.
Front stoops from 3½ to 5 feet high, with ramp and knee rounded rail, square balusters, the sides inclosed with boards tongued and beaded, all firmly fixed complete, ...	16 00	9 00
Ditto, with straight rails framed into newels, .	15 00	8 00
Common platforms, with one or two steps, prepared and fixed complete, . at per foot super.	13	06

PRIME COST OF IRONMONGERY USED BY BUILDERS.

NAILS AND BRADS.

Cut nails, assorted sizes, per pound,	8
Cut brads ½ inch, per thousand,	12
Ditto, ¾ . ditto,	13
Ditto, 1 . ditto,	14
Ditto, 1¼ . ditto,	18
Ditto, 1½ . ditto,	22
Ditto, 1¾ . ditto,	27
Ditto, 2 . ditto,	30
Wrought nails, assorted sizes, . per pound,	19
Wrought spikes, ditto,	10

AVERAGE PRICE OE CUT NAILS, per hundred in number.

100 of 5 in. spikes, wt. 7 lbs. 12 oz. at 10 cts. per lb.	84
100 of 20d. brad heads, wt. 3 lbs. 0 oz. at 8 cts. per lb.	24
100 of 12d. fine brad heads, wt. 1 lb. 12 oz. at 8 cts. per lb.	14
100 of 10d. stout heads, wt. 2 lbs. 0 oz. at 8 cts. per lb.	16
100 of 6d. fine stout heads, wt. 12 oz. at 8 cts per lb.	6

PULLIES.

1⅜ in. common iron, per doz.	37½
1¾ ditto, . ditto,	47½
1¾ Clark's best, ditto,	55
1¾ brass face, . ditto,	1 25
1¾ brass face and wheel, per doz.	1 50

HANDLES.

Draw or lifting handles, per doz.	87½
Japanned ditto, ditto,	81
Large brass ditto, ditto,	1 87½
Small size ditto, ditto,	1 37½

BOLTS.

7 inch round necked bolts, each	25
Ditto, strong, . ditto,	28
Ditto, small, . ditto,	10
Bright spring bolts, ditto,	12
Small bolts and nosings, each	18
Flush bolts, . ditto,	18
Shutter bolts, . ditto,	37½
3½ in. brass knob and knee bolts, . . ditto,	12

PRIME COST OF IRONMONGERY USED BY BUILDERS.

[CONTINUED.]

BOLTS. — Continued.	
6 in. best round bolts, each	21
Strong rod bolts, ditto,	21
Square spring bolt and staple, . . ditto,	25
4 in. brass knob neck bolts, each	07
10 in. shutter bars, ditto,	18

CAST BUTTS.	
1½ inch common butts, per doz.	37½
2 inch patent, ditto,	50
2¼ ditto, ditto, ditto,	62½
2⅜ ditto, ditto, ditto,	67½
2½ ditto, ditto, ditto,	75
2⅝ ditto, ditto, ditto,	82½
2¾ ditto, ditto, ditto,	87½
3 ditto, ditto, ditto,	97½
3¼ ditto, ditto, ditto,	1 12
3½ ditto, ditto, ditto,	1 25
3¾ ditto, ditto, ditto,	1 38
4 ditto, ditto, ditto,	1 50
4½ ditto, ditto, ditto,	2 00
5 ditto, ditto, ditto,	2 50
3 in. by 3 in. Day's patent, per doz.	2 37
3 by 3½, ditto, ditto,	2 48
3½ by 3½, ditto, ditto,	2 54
3 by 4, ditto, ditto,	2 57
3½ by 4, ditto, ditto,	3 75
4 by 4, ditto, ditto,	3 12
4 by 4½, ditto, ditto,	3 37½
4½ by 4½, ditto, ditto,	3 75
5 by 5, ditto, ditto,	4 50
5 by 5½, ditto, ditto,	4 75
5½ by 5½, ditto, ditto,	5 00
6 by 6, ditto, ditto,	6 00

DAY'S PRICES.	
Ways for sliding doors, per set,	12 00
Sheaves, or rollers for ditto, 6 inches, . ditto,	14 00
Lock, box, bolts, and astragals, . . .	24 00
Set of sliding door furniture, complete, . .	50 00
Sliding door lock and plate, with 2 sets of furniture,	9 00
10 in. front door lock, with night key, . .	10 00
9 in. . ditto, .	9 00
9 in. upright ditto, .	9 00
8 in. . ditto, .	7 00
10 in. store door ditto, made safe, . . .	9 00
9 in. . ditto, .	8 00
8 in. ditto, for thin doors,	6 50
9 in. rim locks, without night key, . .	5 50
8 in. ditto, . .	4 50
7 in. ditto, . .	2 50
6 in. ditto, brass striker,	2 12½
6 in. ditto, iron ditto,	2 00
Rebated locks for folding doors, ...	5 50
Mortice locks, for 6 or 8 panel doors, . .	4 25
Upright locks for 8 panel doors, . . .	2 50
Upright ditto, one side mortice furniture, .	3 00
10 in. dead locks, made safe, without knob, .	7 50
9 in ditto, . .	6 00
8 in. ditto, . .	5 00
7 in. ditto, made plain,	1 75
6 in. ditto. . .	1 25

PRIME COST OF IRONMONGERY USED BY BUILDERS.

[CONTINUED.]

DAY'S PRICES,

Continued.

5 in. dead locks, made safe, without knob,	$1 12½
4 in. ditto,	1 00
Folding door bolts, 18 and 9 in. per pair,	2 25
Ditto, 24 and 9 in. ditto,	2 50
Ditto, 30 and 9 in. ditto,	2 75
Ditto, 36 and 9 in. ditto,	3 00
Ditto, 42 and 9 in. ditto,	3 25

SCREWS.

⅝ or ¾ in. screws, per gross,	35
Inch . ditto, ditto,	37½
1¼ inch ditto, ditto,	50
1½ inch ditto, ditto,	60
1¾ inch ditto, ditto,	75
2 inch ditto, ditto,	94
3 inch ditto, ditto,	1 75
Stout bed screws, each,	06
Hand rail screws, ditto,	75
Common ditto and nuts, per dozen,	1 32
Wrought shutter screws, each,	25

FLAPS.

1¼ inch table flaps, per doz.	50
1½ back flaps, . ditto,	50
2 table flaps, . ditto,	75
2½ back flaps, . ditto,	56

WROUGHT HINGES.

Large plate hinges, per lb.	12
16 inch welded plate hinges and rivets, per pair,	47
Strong joint ditto, ditto,	88
18 inch plate hinges, ditto,	63
Superior welded blind hinges, . per pair,	82

LATCHES.

Norfolk, common latches, each	$ 12
Ditto, medium size, ditto,	18
Ditto, large, . ditto,	31
Gate latches, . ditto,	50

KNOBS.

Screw knobs, per doz.	22
Brass knobs and roses, ditto,	56
Large knobs for plating, per doz.	1 00
Flint glass knobs, ditto,	1 25

LOCKS.

Fine brass tumbler cupboard locks, . each	62½
6 inch best brass bushed dead locks, . each	87½
7 inch ditto, . ditto,	12
Good stock locks, ditto,	50

VARIOUS ARTICLES.

Door springs, . each	75
Patent ditto, . ditto,	1 75
Sash springs, . ditto,	12½
Brass spiral springs, ditto,	25
Patent blind fastenings, per set,	44
Best sash fastenings, per doz.	4 00
Sash cord, per pound,	43
Sash weights, . ditto,	02½
Shutter hooks and eyes, per doz.	34
Stubs and plates, ditto,	37½
Shutter lifts, . ditto,	37½
Sash rollers, . each	05
Brass buttons on plates, do.	12½

PRIME COST OF IRONMONGERY USED BY BUILDERS.

[CONTINUED.]

VARIOUS ARTICLES, Continued.		SMITH WORK. Continued.	
Trace chains, for coal vault stoppers, per pair,	$ 62½	Bolts, nuts, &c. only, per lb.	$ 14
Staples for ditto, per doz.	37½	Plain wrought railings, do.	10
Glass paper, per quire,	31½	Ornamental ditto, ditto,	12
Best glue, per pound,	31½	Highly ornamental ditto,	15
Tenter hooks, per doz.	04	Cast iron sash weights, per lb.	02½
Escutcheons, . ditto,	31	Ditto, columns, ditto,	04
Pins for ditto, per pound,	87½	Ditto, to smaller castings, per lb.	05
Brass cabin hooks, large, each	1 12		
24 inch brass stair rods, per doz.	1 00	PRICES OF PLATING.	
Brass eyes for ditto, ditto,	25	Silver plating, the furniture of front door lock, outside, . . .	3 50
Brass head nails, for ditto, per doz.	06	Ditto, ditto, inside, .	1 00
Brass hat hooks, ditto,	1 12½	Ditto, mortice lock furniture and striking plate, .	3 75
Japanned iron ditto, ditto,	25	Ditto, front of lock and striking plate only, .	50
Hat and coat hooks, ditto,	69	Ditto, 2 sets of furniture for sliding door locks, .	6 50
Line hooks, . ditto,	37½	Ditto, astragal and front of lock, . . .	13 50
SMITH WORK.		Ditto, hinges, 5 by 5, per pair,	4 00
Wrought straps, ties, &c. per lb.	08		
Ditto including bolts, nuts, &c. . . per lb.	10		

CARVERS' PRICES.

	$ cts.
Preparing and carving the Ionic capital, from the Temple on the Ilissus, . at per inch of the diameter of column,	50
Ditto, ditto, from the Erechtheum, ... ditto,	1 25
Ditto, the Corinthian capital, from the Lantern of Demosthenes ditto,	2 00
Ditto, Capitals of Antæs, ⅓ the price of those of columns.	
Ditto, enriched Grecian consoles, or trusses, . at per inch,	25
Carving enriched ovolo and bead, or ogee and bead, with egg and tongue, or leaf and dart, from 3 to 6 inches deep, per ft. run	37
Ditto, ditto, rough, for outside cornices, . . . ditto,	31

OF TIN AND COPPER COVERING.

Tinned sheets, when properly laid, make a very good covering for roofs; and if painted occasionally, will last for a considerable length of time. The best way is to double lap the edges of the seeths, and insert white lead between them as they are laid; in this way they are rendered perfectly secure against the admission of wet without the use of solder. Tin sheets are made up in boxes of 225 in each, which cost $9.00 per box. The size of the sheets is 14 inches by 10 inches and 132 are sufficient to lay a square. The cost per square will therefore be as under.

Double cross tin, laid on roofs complete, . . per square,	12	00
Single cross ditto, ...	11	00
Common ditto, ...	10	00
4 inch tin water pipes or conductors, including heads, elbows, shoes, &c. . . . . per foot run.		15
3 inch . ditto, . . ditto,		12
2 inch . ditto, . . ditto,		09

Sheet copper of 16 ounces to the foot, is the usual thickness laid on gutters, &c. The copper costs 25 cents per pound. Copper nails, 50 cents per pound. About 4 lbs. of nails will be required on an average to lay 100 lbs. of copper.

OF PLUMBERS' WORK.

This business has not until lately been much encouraged in this country; but as persons now, pay more regard to domestic conveniences than formerly, a great variety of advantages, attainable only through means of the plumber, are every day becoming more fashionable in our habitations.

The rain water which is conveyed down the fronts of our houses in tin pipes, causing an unsightly appearance, might be rendered subservient to a variety of useful purposes, if secured in a large cistern in the upper story; the overflow could be brought down a waste pipe, and discharged into the funnel from the water closets, and the deficiency in dry weather supplied by a pump from the bottom. By these means, the great advantage that would result from having water always at command in every story, for the daily use of bed chambers, baths, water closets, &c., independent of the degree of safety it would afford in cases of fire, must be manifest to all.

A small closet, or recess, enclosed by a door, could be placed close to the water closet, containing a sink, with an under-waste and trap, leading into the funnel for the reception of slops, and a water pipe with a cock placed over the sink, leaving room for a pail between would always afford the means of drawing clean water for any purpose, and disposing of the dirty water without the trouble of carrying it down.

The objections to these arrangements are, the danger of the pipes being frozen in winter, and the consequent chance of their bursting and inundat ing the house; but where a building is heated by a hot air stove, those dangers would be effectually guarded against, by having all the pipes brought down a recess made in the party wall, enclosed on front by moveable panels, screwed into rebated grounds, beaded and fixed flush with the plaster. Into this recess, a portion of the hot air could be introduced from the stove at the botton, which, by ascending the recess, would always keep the pipes warm, and perfectly secured from frost; at the top, the heated air could be let into the cistern between the surface of the water and a closed lid; by which the water in the cistern, as well as the pipe leading from the gutter thereto, would also be kept from freezing.

In all cases, the greatest care should be observed in constructing water closets and laying pipes inside of houses; for if done imperfectly, or by persons unacquainted with the business, accidents may occur from imperfect joints, and other causes, by which the floors may be overflowed with water, and cause such injury to the ceilings and walls, as will require much time and expense to repair; but when properly executed, there need not be the slightest apprehension of this kind.

PRICES FOR LEAD WORK.

The average price of cast, sheet, or milled lead, as well as every other description of lead work, must depend upon the current price of pig lead; the market price of which must regulate the cost of every article made of this metal. The prices to be charged at the present time are as under.

	$ cts.
Cast lead, per 100 lbs.	10 00
Milled ditto, . ditto,	10 00
Solder, . per pound,	25
Cast lead in exchange, per 100 lbs.	4 00
Milled ditto, . ditto,	4 00
Square cistern heads, each	5 25
Ditto, moulded capped, do.	7 50
Ornamented block do, do.	10 00
4 lbs, per hundred alllowed on old lead for dirt, &c.	
RAIN WATER PIPES, Including Flaps and Collars.	
3 inch, per foot run.	60
3½ inch, . ditto,	72
4 inch, . ditto,	84

WATER PIPES.	$ cts.
½ inch 8 lbs. to the yard, per foot run.	28
¾ inch, 10 ditto, . ditto,	33
1 inch, 12 ditto, . ditto,	40
1¼ inch, 16 ditto, . ditto,	52
1½ inch, 20 ditto, . ditto,	70
2 inch, 24 ditto, . ditto,	80
SOLDER JOISTS TO WATER PIPES.	
½ inch complete, . each	42
¾ inch, ... ditto,	54
1 inch, ... ditto,	66
1¼ inch, ... ditto,	84
1½ inch, ... ditto,	1 08
2 inch, ... ditto,	1 37

PRICES OF LEAD WORK.—Continued.

FUNNEL PIPES.	
4 inch, complete, per ft. run.	$ 56
4½ inch, . . ditto,	65
5 inch, . . ditto,	85
5½ inch, . . ditto,	1 12
6 inch, . . ditto,	1 37

SOCKET PIPES FOR SINKS.	
2 inch, . per ft. run,	92
2½ inch, . . ditto,	70
3 inch, . . ditto,	80
3½ inch, . . ditto,	90
4 inch, . . ditto,	1 10

COMMON LEAD PUMPS.	
2½ inch, complete, .	15 00
3 inch, . . .	18 00
3½ inch, . . .	21 00
4 inch, . . .	25 00

HYDRAULIC PUMPS. FIXED ON PLANKS.	
2 inch, complete, .	35 00
2½ inch, . . .	42 00
3 inch, . . .	49 00
3½ inch, . . .	56 00
4 inch, . . .	63 00

WATER CLOSETS.	
Pan closet, with valve complete, . .	50 00
Ditto, with patent valve and apparatus complete,	60 00

LEAD AIR TRAPS, WITH BELLS AND GRATES.	
3 inch, . . each,	1 50
3½ inch, . . ditto,	2 00
4 inch, . . ditto,	2 50
4½ inch, . . ditto,	3 00
5½ in ch, . . ditto,	3 50

BRASS GRATES.	
2 inch, . . each,	$ 25
2½ inch, . . ditto,	32
3 inch, . . ditto,	40
4 inch, . . ditto,	50

WASHER & WASTES, OR PLUGS.	
¾ inch, . . each,	75
1 inch, . . ditto,	1 00
1¼ inch, . . ditto,	1 40
1½ inch, . . ditto,	1 60
2 inch, . . ditto,	1 80
3 inch, . . ditto,	2 00

SHORT SPINDLE VALVES.	
1 inch, . . each,	87½
1¼ inch, . . ditto,	1 50
1½ inch, . . ditto,	2 25
2 inch, . . ditto,	2 87½
3 inch, . . ditto,	3 50

LONG SPINDLE VALVES.	
1½ inch, . . each,	3 25
2 inch, . . ditto,	4 00
2½ inch, . . ditto,	4 75
3 inch, . . ditto,	6 50

DRIVING FERRULES.	
¾ inch, . . each,	1 00
1 inch, . . ditto,	1 50
1¼ inch, . . ditto,	2 00
1½ inch, . . ditto,	2 50
2 inch, . . ditto,	3 00
3 inch, . . ditto,	3 50

PRICES OF LEAD WORK.—Continued.

STOP COCKS.

SQUARE WAY, TURN BARS.

½ inch, . .	each,	$1 00
¾ inch, . .	ditto,	1 25
1 inch, . .	ditto,	2 00
1¼ inch, . .	ditto,	2 50
1½ inch, . .	ditto,	3 50

BIB AND BALL COCKS.

½ inch, . .	each,	1 25
¾ inch, . .	ditto,	1 75
1 inch, . .	ditto,	2 50
1¼ inch, . .	ditto,	3 12
1½ inch, . .	ditto,	4 25

COPPER WATER BALLS,

WITH WROUGHT RODS.

For ½ inch cock,	each,	0 82
¾ inch ditto,	ditto,	1 00
1 inch ditto,	ditto,	1 50
1¼ inch ditto,	ditto,	2 00
1½ inch ditto,	ditto,	3 00

BATHING TUBS,

Lined with lead,	each,	23 00
Smaller ditto,	ditto,	15 00
Coppers, for heating	ditto,	
	per pound,	0 50

BASINS.

Plain pan closet, including fan, and mounting.	$8 00
Blue printed ditto, .	10 00
Plumber, per day, .	2 00
Laborer, ditto, from $1 to	1 25

ROTARY PUMPS.

Plain rotary pumps, each,	30 00
Best, ditto, . .	50 00
Leather hose for ditto, per ft. run.	0 50
Coupling screws for ditto, per sett,	1 50
Brass nozzle for ditto,	1 50

One pound of solder will serve to make a foot long of solder joint.

A table showing the weight of sheet lead, from $\frac{1}{16}$ of an inch to 1 inch thick.

Thickness.	Wt. per ft. super.
$\frac{1}{16}$ inch, .	3 $\frac{2}{4}$ pounds.
$\frac{1}{12}$ inch, .	5 "
$\frac{1}{10}$ inch, .	6 "
$\frac{1}{8}$ inch, .	7$\frac{1}{2}$ "
$\frac{1}{6}$ inch, .	10 "
$\frac{1}{5}$ inch, .	12 "
$\frac{1}{4}$ inch, .	14$\frac{3}{4}$ "
$\frac{1}{3}$ inch, .	19$\frac{3}{4}$ "
$\frac{1}{2}$ inch, .	29$\frac{1}{2}$ "
$\frac{3}{4}$ inch, .	44$\frac{1}{4}$ "
1 inch, .	59 "

PAINTERS' WORK.

There is no department in the art of building, in which the inferiority of our style of execution, and the consequent want of effect, when compared with that of other countries, is more apparent than in our common house painting and coloring. A better taste, however is beginning to prevail; the harsh and glaring contrasts of red and white, so prevalent in the front of our streets, as well as the equally tasteless daubings in some of our interior decorations, are giving way to a more chastened style in the application of colors; but much yet remains to be done in the manner of execution. In most cases, two coats of paint are considered quite sufficient for every purpose, when even these are perhaps composed of boiled oil, new lead, and other colors laid on without any body upon the work: this produces a gloss for a short time; but as the oil soon becomes absorbed by the wood, or plaster, or evaporated by the action of the atmosphere, the surface of the wood is left bare, and every imperfection of the joiners' or plasterers' work exhibited to the eye; rendering it necessary to paint the house every year, or second year at farthest, to keep it in any thing like respectable condition. Whereas, if, when a new house has stood a year or two to give time for the walls to become dry, and the joiners' work, floors, and partitions to have shrunk, and become properly settled, one good painting, with four coats of body color, composed of the best materials, and properly executed, will last for several years by occasionally cleaning the surface of the paint, and will always look incomparably better than when done in the former manner, even with painting every year. I have thought it necessary to say thus much, with the hope of inducing persons to bestow greater attention to this particular department, as the superior elegance of which the plainest finished house may be made susceptible, by judicious and tasteful painting, must be obvious to any person who has given the least attention to the subject.

A considerable degree of ornamental effect might be economically produced by painting on plain cornices and walls, as was practised by those great masters of taste, the ancient Greeks, in some of their temples; and as was found to be the case in the excavations at Pompeii.

PAINTING IN DISTEMPER,

OR WATER COLORS MIXED WITH SIZE.

When stucco or plaster, which is intended to be painted in oil when finished, is not sufficiently dry to receive the oil color, but requires coloring to give it a more finished appearance, it may have one or two coats in water colors of any desired tint. It will require two coats to cover the plaster, and bear out a uniform appearance. It must be remembered, that when the stucco is sufficiently dry, and it is desired to have it painted in oil, the

whole of the water color should be washed off, which is easily done with hot water; and when quite dry, the oil color can be laid on. When ceilings and cornices are much ornamented, the best way is to give them two coats of oil color, and afterward paint them in water colors. The advantages of this method are, that, if the mouldings or enrichments become clogged up with color, it can be all washed off to the oil, at any time, and colored afresh, without injury to the enrichments.

When the old plaster has become discolored by stains, and it be desired to have it painted in distemper, it is then advisable to give the old plaster, when properly cleaned off and prepared, one coat, at least of white lead and oil, with spirits of turpentine, which will generally fix all old stains; and when quite dry, will take the water colors very kindly.

TO MEASURE PAINTING.

Painting is measured wherever the brush goes; and on all wainscotting, walls, doors, shutters, jamb linings, architraves, and all other places over nine inches girt, is taken at per yard super. On all articles under nine inches girt, at per foot run. On all framed work, the nett length is taken one way, and the dimensions girted over the mouldings, panels, &c. the other way.

Chimney pieces, ornamented ceilings, and other enriched work, picked in, and small detached pieces done with variegated or fancy colors, &c. by the foot super.

Ornamental or carved mouldings, cornices, fascias, skirtings, water trunks, hand rails, and other small articles, at per foot run.

Sash frames, casements, skylights, &c. at per piece. Sash squares at per dozen.

By party colors is meant, that the framing of doors, shutters, &c. is of a different shade from that of the panels. When work is done in this way, it deserves an extra price for the trouble incurred by applying two colors.

MATERIALS USED IN PAINTING.

White lead is the principal ingredient used to give body to colors for house painting, and that kind which is most esteemed for what is called *flatting* or dead white, is imported from England. This article is so frequently adulterated with common whiting, that it cannot be too carefully examined before it is used, Perhaps the superiority of the English lead is chiefly attributable to its being longer kept, as there is no doubt but the American lead, if kept for two or three years, would be found to answer every purpose. Litharge, or oxide of lead, is used as a dryer; but for delicate colors, or fine whites, sugar of lead answers the purpose much better.

Linseed oil should also be kept for two or three years, that it may precipitate its coloring particles, as the more transparent it is, the better will be the paint of which it forms a component part,

In Holland, linseed oil is clarified by the following process, which gives it the same effect as that acquired by age. They put any quantity of oil into a well glazed pot or other vessel, and to it add fine sand and water; of each, an equal quantity as of the oil; and having covered the vessel with glass, expose it to the sun, and stir it every day. This process soon renders it very white, and when sufficiently bleached, is allowed to settle for two days, and poured off for use. Drying oil, or boiled oil, is usually prepared in the following manner: — For every gallon of oil, take litharge, white lead, plaster of paris, and umber, of each 4 ounces; mix them together and boil over a slow fire, taking off the scum as it rises, when the scum assumes a reddish color, withdraw the fire and leave the oil to cool and settle; by which it becomes fit for use.

Oil of turpentine, or *turps*, as it is called, improves also very much by age, as the older it is, the longer will the work performed with it retain its color. It is much used in *flatting*, for which purpose it should be of the best quality.

PRICES OF MATERIALS USED IN PAINTING.

	$	cts.
Best English white lead, per 100 lb.	14	00
American ditto, ditto,	13	00
Linseed oil, per gallon,	1	00
Boiled ditto, . ditto,	1	12
Turps, . . ditto,		50
COLORS GROUND,		
AND READY TO MIX.		
White lead, . per lb.		16
Lead color, . ditto,		16
Straw color, mixed with chrome, . per lb.		25
Green, good, . ditto,		50
Yellow, common, ditto,		12
Black color, . ditto,		25
Stone color, . ditto,		16
Red lead, . ditto,		16
Chocolate color, ditto,	$	18
Venetian red, . ditto,		14
WRITING.		
Plain letters, per inch high, each,		01
Sunk ditto, . ditto,		02
Bronzed ditto, heightened with gold and relieved, each		04
Gold ditto, under 3 inches, per inch each,		04
Ditot, from 3 to 6 inches,		05
Ditto, from 6 to 9 inches,		06
Ditto, from 9 to 12 inches,		07
If shadowed, . add		01
Double shadowed, or indented, . . add		02
Letters enamelled in gold, on glass per inch each,		08

PRICES OF PAINTING COMMON COLORS:

AS LEAD, STONE, CHOCOLATE, WHITE.

	$ cts.
One coat in oil, including knotting and stopping, per yard,	07
2 coats ditto, ditto,	12
3 coats ditto, ditto,	16
4 coats ditto, ditto,	20
Flatting dead colors, once, per yard,	07
Ditto, twice, ditto,	12
For French greys, fawns, or olive greens, add to the above prices, per yard,	03
Warm tints, lilacs, light greens, peach colors and the like . . add	04
French green, deep green, yellow, blue verditer, scarlet, and lake colors, add	08
Sanding, . per yard,	06
If any of the above be done in party colors, add extra, . per yard,	05

SKIRTINGS AND CORNICES.

Skirtings and plinths, not exceeding 9 inches girt,	
1 coat in oil, per foot run.	02
2 coats, . . ditto,	03
3 coats, . . ditto,	04
4 coats, . . ditto,	05
If flatted, add . ditto,	02

ENRICHED CORNICES,

Base or Impost Mouldings, Chimney Caps, Carved Work, or other Enrichments.	
1 coat in oil, per foot super.	03
2 coats, . . ditto,	06
3 coats, . . ditto,	08
4 coats, . . ditto,	10
If flatted, add ditto,	02

REVEILS TO DOORS AND WINDOWS.

1 coat in oil, per foot run.	
2 coats, . . ditto,	02
3 coats, . . ditto,	03
4 coats, . . ditto,	04
8 inches, add ⅓ ditto,	05

WATER PIPES.

1 coat in oil, per foot run.	02
2 coats, . . ditto,	04
3 coats, . . ditto,	06
If finished green, add extra, per foot run.	02

WINDOW SILLS,

Stringings, Edges of Coping, &c.

1 coat in oil, per foot run.	03
2 coats, . . ditto,	06
3 coats, . . ditto,	08
4 coats, . . ditto,	10

HAND RAILS, Newels, Base Mouldings, &c.

1 coat in oil, per foot run.	02
2 coats, . . ditto,	03
3 coats, . . ditto,	04
4 coats, . . ditto,	05
If hand rails grained add do.	06
If varnished, add do.	06
Mouldings, or edges cut in, add per foot run.	02

SASH FRAMES.

1 coat in oil, inside or outside, . . each	18
2 coats, ditto, ditto,	34
3 coats, ditto, ditto,	48
4 coats, ditto, ditto,	60

PRICES OF PAINTING COMMON COLORS.—Continued.

Sash squares, 1 coat, per dozen,	$ 18		Cross banding ditto, ditto,	$ 06	
Ditto, 2 coats, ditto,	34		Light shadowed, or broad ebony lines, to form panels, . . per foot run.	02	
Ditto, 3 coats, ditto,	48		Athenian scroll and lotus corners, . . each	60	
Ditto, 4 coats, ditto,	60		Marbling, on dead white ground, per foot super.	06	
If flatted, add ditto,	12		Dove, or burdilla do. ditto,	08	
IMITATIONS, Marbling, &c.			Antico, oriental, or verd antique, per foot super.	14	
The value of this description of work depends entirely on the ability of the artist; but if done in a superior manner, the following prices may be considered a fair equivalent:			If fluted in columns, add ditto,	04	
			Varnishing once with best copal, . per yard,	18	
Wainscot, or oak, per foot super.	06		Ditto, twice, . ditto,	30	
Mahogany, . ditto,	08		Ditto, three times, ditto,	42	
Coromandel, or rose wood, per foot super.	12		If polished, add ditto,	08	
Hair, or satin wood, ditto,	12		Spirit varnish, each coat, per yard,	12	
Yew tree, or Amboyna wood, per foot super.	18		MOULDINGS CUT IN.		
Mouldings or edges cut in of the same wood, per ft. run.	04		Metal bronze, not exceeding 2 in. girt, per ft. run.	06	
			Oil gold, $\frac{1}{2}$ inch girt, ditto,	08	
			Ditto, $\frac{3}{4}$. ditto,	12	
			For every $\frac{1}{4}$ inch, add ditto,	04	

PAPER HANGING.

French paper for rooms is 18½ inches wide, and contains 9 yards in a piece. It costs from 25 to 100 cents per piece, according to the quality of the paper, the variety of the patterns, or the richness of the tints.

English paper is 20 inches wide, and contains 12 yards to the piece; its prices are also as various as its quality. If the number of superficial feet contained in a room, be divided by 5, it will show the number of yards; or by 60, it will show the number of pieces of English paper required.

If the number of feet contained in a room, be divided by 4.6, it will show the number of yards, or by 41.6, it will show the number of pieces of French paper required.

Sizing the walls and hanging paper, costs from 25 to 32 cents per piece, including the bordering.

SLATERS' WORK.

Slates used for covering roofs, are imported from England and chiefly raised in the quarries of North Wales, the best kinds of which are Donnybole Rag, Imperial, Duchess, Countess, Ladies, and Doubles.

The Rags and Imperials being thick and heavy, are well calculated to resist the effects of stormy weather in exposed situations. The latter descriptions being lighter and much less expensive, are those most commonly used.

AVERAGE SIZES OF SLATES.

	ft.	in.		ft.	in.
Rag slates,	3	0	by	2	0
Imperial ditto,	2	6	by	2	0
Duchess ditto,	2	0	by	1	1
Countess ditto,	1	8	by	0	10
Ladies' ditto,	1	3	by	0	08
Doubles ditto,	1	1	by	0	06

1 ton of Rags will cover 2 squares, and will weigh 10 cwt. on a square.

1 ditto of Imperials,	2¼ ditto,	8	ditto.
1000 Dutchess slates,	9 ditto,	6	ditto.
1000 Countess ditto,	5 ditto,	5	ditto.
1000 Ladies' ditto,	3¼ ditto,	5	ditto.
1000 Doubles ditto,	2¼ ditto,	5	ditto.

Ladies' slates are those most generally used and cost from $7.50 to $7.75 per square, laid complete.

In measuring slaters' work, the dimensions should be taken so as to obtain the whole number of superficial feet of covering; to this 6 inches run. should be allowed for the eaves, hips, valleys, skylights, or wherever cut to irregular lines; and all skylights, dormers, &c. deducted therefrom.

PLASTERERS' WORK.

The following information, relative to Plasterers' Work, was omitted in that portion of the publication which treats on this subject.

Cast and enriched centres to ceiling, fixed, &c. complete, 18 in. diameter,	each,	$4	00
Ditto, 2 feet diameter,	ditto,	6	00
Ditto, 2 ft. 6 inches diameter,	ditto,	8	00

NOTE.—Articles of this description vary so much in style, it is impossible to fix prices for every description.

Circular enrichments on ceilings, round centres, 5 in. on the face,	per foot run.	0	50
Ditto, laid in moulded frame, on ditto, to be twice the price of straight of the same description.			
Rosettes, cast and fixed in panels, 9 inches diameter,	each,	0	75
Ditto, 10 inches "	ditto,	1	00
Ditto, 12 inches "	ditto,	1	25
Ditto, 15 inches "	ditto,	1	75
Plain moulded trusses, 1 foot long,	ditto,	1	50
Ditto, enriched with Grecian ornaments,	ditto,	1	75
Ditto, plain, 1 ft. 3 in. long,	ditto,	2	00
Ditto, enriched "	ditto,	2	50
Ditto, plain, 1 ft. 6 in. long	ditto,	3	00
Ditto, enriched, "	ditto,	3	50

GLOSSARY OF TECHNICAL TERMS.

A.

Abacus. The upper member of a capital of a column.
Acropolis. The highest part of a city.
Acroterium. The extremity or vertex of any thing.
Amphora. A vase or earthern jar.
Ancones. Ornaments depending from the corona of Ionic door-ways.
Annulets. Small square fillets in the Doric capital under the ovolo.
Antæ. A species of pilasters, common in Grecian buildings.
Arabasque, or Moresque. Something done after the manners of the Arabians, or Moors, and destitute of human or animal figures.
Architrave. That part of an entablature which lies immediately upon the capital or head of columns.
Ashlar. The facing of squared stone-work on front of a building.
Astragal. A moulding consisting of a half round, with a small filet on each side.

B.

Back of a window. That part, inside of the room, directly under the sash frame.
Back flaps. Additional widths hung to the front shutters to inclose a window.
Balcony. An open gallery projecting from the front of a building.
Baluster. A small kind of column, or pillar, belonging to a balustrade.
Balustrade. A range of balusters supporting a cornice, and used as a parapet or screen for concealing a roof, or other object.
Bargecourse. That part of the covering which projects over the gable of a building.
Base. The lowest part of a figure or body.
Bay-window. A window projecting from the front, in two or more planes, and not forming the segment of a circle.
Bead. A round moulding.
Beam-filling. Filling up the spaces between joists, or timbers, with masonry.
Bearing-wall, or Partition. Is a wall resting upon a solid, and supporting some other part.
Belfry. The part of a steeple in which the bells are hung.
Belvedere. An ornamental tower, or observatory.
Boxings of a window. The two cases, one on each side of a window, into which the shutters are folded.
Bracketing. Pieces of wood fixed to form cornices, panels in ceilings, &c. to which the laths are nailed.
Bressumer. A beam supporting a wall over a gateway or opening, laying horizontally.
Bricknogging. Filling in the spaces between studs of partitions with bricks and mortar.
Buffet. An ornamented cupboard, or cabinet, for plate, glasses, china, &c.

C.

Caisson. A vessel made of strong timbers, in which the pier of a bridge is built, by sinking it as it advances, till it comes in contact with the bed of the river; the sides are then disengaged and removed, leaving the bottom under the pier.

Campana. The body of the Corinthian capital.

Campanula, or Guttæ. The drops of the Doric architrave.

Cantalivers. Ornamented pieces of wood, or iron, projecting from a wall, to support a balcony, &c.

Cap. The uppermost of an assemblage of parts.

Capital of a column. The upper portion contained between the top of the shaft and the under side of the architrave.

Carcase framing. The naked framing of wooden buildings.

Caryatides. An order of columns, or pilasters, composed of female figures, dressed in long robes, supporting an entablature.

Case of a door. The frame in which the door is hung.

Casements. Sashes or glazed frames opening on hinges.

Castellated. Built in imitation of an ancient castle.

Catacomb. A subterraneous place for the interment of the dead.

Cavetto. A hollow moulding.

Ceiling. The upper horizontal surface of a room.

Cesspool. A deep hole, or well, under the mouth of a drain, for the reception of sediment, &c., by which the drain might be choaked.

Chaplet. A small carved or ornamented fillet.

Clamp, in joinery. A piece of wood fixed to the end of a board.

Clear-cole, in painting. A coat of whiting and size laid on walls, &c.

Colar-beam. A piece of timber framed between two queen posts.

Colonnade. A range of columns.

Comparted. Divided into smaller parts.

Conservatory. A superior kind of greenhouse.

Console. A bracket with scrolled ends to support a cornice, &c.

Coping. The stones laid on the top of a wall to defend it from wet, &c,

Corbeils. Carved work, representing baskets filled with fruits or flowers, used as ornaments.

Corbels. Stones, or timbers, fixed in a wall, or side of a vault, for sustaining the timbers of a floor or roof.

Cornice. Any moulding or projection that crowns or finishes the part to which it is attached.

Cornucopia. The horn of plenty.

Corona. Part of a cornice.

Corridor. A long gallery or passage surrounding a building.

Counter-forts. Projections of masonry from a wall, at regular distances, for strengthening it, or resisting a pressure.

Course. A continued level range of stones or bricks in a wall.

Cove. Any kind of concave moulding.

Crockets, in Gothic architecture. The ornaments placed along the angles of pediments, pinnacles, &c.

Crosettes, in decoration. The trusses or consoles on the flanks of the architrave under the cornice.

Crown. The uppermost member of a cornice.

Crypt. An ancient name for the lowest part or apartment of a building.

Cupola. A dome, arched roof, or turret.

Curtail-step. The first step of a stairs with a spiral end.

Cusps. The pendants of a pointed arch.

Cymatium. The summit of a cornice.

D.

Dentils. Small blocks placed at equal distances under a cornice.

Die of a pedestal. The part comprehended between the base and cornice.

Diglyph. A tablet with two engravings or channels.

Dishout. To form coves, by means of ribs or wooden vaults, for plastering upon.

Distemper, in painting. Colors mixed up with size or other glutinous substances.

Dressings. All mouldings projecting beyond the naked of walls or ceilings.

Drops. Small cylindrical pendant ornaments of the Doric order.

Dwarf-walls. Are those of less height than the story of a building.

E

Eaves. The margin or edge of a roof overhanging the walls.

Elbows of a window. The two panelled flanks under the shutters, generally tongued into the *back.*

Embattled. A building with a parapet having embrasures, resembling a batterry or castle.

Embossing. Forming work in relievo, whether cast, moulded, or cut with a chisel.

Emplection walls. Walls bonded, like those of the Greeks and Romans.

Estrados of an arch. The outside circumference.

F

Facase. The face or front of a building.

Fasica. A plain course of stone projecting a little before the face of the ashlar.

Fillet. A narrow string or band.

Fine stuff, for plastering, is composed of lime, putty, and fine sand.

Flashings, in plumbery. Prices of lead, from six to nine inches wide, fixed around the extreme edge of a flat or gutter.

Floating, in plastering. The second coat of three coat work.

Flue or *Funnel.* The opening in a chimney for carrying off the smoke.

Flutes. The upright circular sinkings surrounding the shafts of columns.

Footings, in masonry. The lower projecting courses of foundations to walls.

Fret. A species of ornament composed of straight grooves, or channelures, at right angles to each other.

Frieze. The middle plain face of an entablature.

Frosted. A species of rustic work, representing ice, formed by irregular drops of water.

Furrings, in carpentry. Slips of timber nailed to joists or rafters, to bring them to the level or fair surface, when they have become uneven by sawing, casting, &c.

G

Gable. The triangular part of the wall of a house or building, immediately under the roof.

Gangway. A temporary stair set up for ascending or descending before the regular stair is built.

Gathering, in a chimney. The sloping part above the fire place, where the funnel contracts or tapers.

Gothic. More properly British architecture.

Graining. Imitating the graining and coloring of wood, marble, &c.

Griffin. A fabulous animal, sacred to Apollo, represented with the head and wings of an eagle, and the body, tail, and legs of a lion.

Groin. The hollow formed by the intersection of two or more simple vaults crossing each other at the same height.

Groined ceiling. A cradling constructed of ribs, lathed and plastered.

Grotesque. A light gay style of ornament, practised by the Romans in the decoration of their palaces, baths, &c.

Ground-plate, or *Sill.* The lowest plate of a wooden building, for supporting the principal and other posts.

Guttæ. See drops.

H

Hall. A large public building. A large room at the entrance of a building.

Hammer-beam. A transverse beam at the foot of the rafter in the usual place of a tie.

I

Impost. The upper part of a wall, &c., under the springing of an arch.

Intrados, of a vault or arch. The interior or concave surface.

J

Jambs. The vertical side of an aperture, as of doors, windows, &c.

K

Keys, in joinery. Pieces of wood let transversely, into the back of a board

by grooving or dove-tailing, to prevent it from warping.

Knotting, in painting. The process for preventing knots from appearing in the finish.

L

Label. An ornament placed over a window, or other opening, in castellated buildings.

Lacunariæ or *Lacunars.* Panels or coffers formed on the ceilings of apartments, and sometimes on the soffits of coronæ.

Lantern. A turret raised above the roof, with windows round the sides, constructed for lighting an apartment beneath.

Luffer-boarding. A series of boards placed in an aperture, so as to admit air into the interior, and to exclude rain.

Lunette. An aperture, with a circular head, in a cylindric or spherical ceiling.

M

Mansion. A large dwelling house, or habitation.

Meros. The middle part of a trigliph.

Metope, in the Doric freize. The square space between the triglipks.

Messanine. A small apartment taken off from the height of another, by means of a floor thrown across level with a stair, landing, &c.

Minaret. A Turkish steeple with a balcony.

Monopteron, or Monoptral Temple. An edifice consisting of a circular colonade, supporting a dome, without any inclosing wall.

Mosaic Work. A combination of small pieces of marble, glass, stone, &c. of various colors and forms, cemented on a ground, so as to imitate paintings.

Mutules. Flat square blocks placed under the corona of the Doric cornice.

N

Nave. The body of a church, reaching from the choir or chancel to the principal door.

Neck of a capital. The space between the channelures and the annulets of the Grecian Doric capital, &c.

Niche. A hollow in a wall, for receiving a statue, &c.

O

Obelisk. A slender quadrangular pyramid, raised as a monument or ornament.

Ogee. A moulding of two members, one concave, the other convex.

Oriel window. A projecting angular window, commonly of a triagonal or pentagonal form, and divided by mullions and transoms into different bays or compartments.

Ova. An ornament, in form of an egg; *Oviculum* is its diminutive.

Out to out. To the utmost extremities, as in taking dimensions.

P

Pagoda. An Indian Temple.

Palace. A name given to dwellings of kings.

Pale. A pointed stake, and a piece of board, used in making enclosures.

Palisade. Pales or stakes set up for an enclosure.

Parapet. A dwarf wall, generally raised to prevent accidents.

Pargeting. Plastering the inside of chimney flues, as they are built up.

Party wall. The wall separating two houses or buildings.

Pedestal. A square body, raised to sustain a column, statue, &c.

Pediment. An ornament of a low triangular figure, crowning the front of a building, and also sometimes as a decoration over doors and windows.

Pier. A square pillar without any regular base or capital.

Pillar. A column of an irregular make, not formed according to rules, but of arbitrary proportions.

Platform. A flat terrace on the top of a building.

Plinth. The square pieces under the mouldings in the bases of columns.

Plugg. Pieces of timber drven perpendicularly into a wall which, when cut off flush, serve to fix the joiners' work to.

Poroh. A kind of vestibule at the entrance of buildings.

Portico. A covered walk, porch, or piazza, supported by columns.

Post and paling. A close wooden fence, constructed of posts set into the ground, and pales nailed to rails between them.

Pronaos. An ancient name for a porch to a temple, or other spacious building.

Proscenium, in a theatre. The stage, or the front of it.

Pugging. Filling between the joists of floors with plaster, &c., laid on boards or laths, to prevent the sound from passing between the stories.

Puzzolana. A substance composed of volcanic ashes and used with lime for cement that sets under water.

Pyramid. A solid massive structure which, from a square, or other base, rises diminishing to a vertex or point.

Q

Quadra. Any square border or frame encompassing a basso relievo, panel, &c.

Quirked mouldings, are those which have a sinking between the convex parts and the adjoining members.

Quoins. This name is applied to the stones in the corners of buildings.

R

Rebate. A square piece removed from the edge of a board.

Ramp, in hand-railing. A cavity on the upper side, formed over risers or winders by a sudden rise of the steps.

Render, in plastering. The first coat of plaster laid upon brickwork.

Reveils. The vertical retreating surface of an aperture, as the two vertical sides between the front of the wall and the sash-frame or door-frame.

Rustic work. That exhibited on the face of stones, by picking with a pointed tool, (called also frosted or vermiculated.)

S

Sagging. Bending downwards in the middle from a horizontal direction.

Sarcophagus. A tomb or coffin of stone, used by the ancients to contain the dead bodies of distinguished personages.

Scribing. Adjusting the edge of a board, so that it shall fit and correspond with a given surface.

Section of a building. A representation of it, as vertically divided into two parts, so as to exhibit the construction of the interior.

Sewer. A common drain or conduct for conveying foul water, &c.

Shoar. An oblique prop, acting as a brace upon the side of a building.

Shoe. That part at the bottom of a water trunk or pipe, for turning the course of the water.

Sill. The lower part of a window, or door.

Soffit. The upper part of any aperture.

Sommering. The continuation of the joints of arches towards a centre or meeting point.

Splayed. One side making an oblique angle with the other.

Stuæ. The fillets separating the flutes of columns.

T

Terras. A strong mortar or plaster, used in aquatic works.

Terrace. An elevated area for walking upon.

Terrace roofs. Roofs flat on top.

Tesselated pavement. A curious pavement of mosaic work, composed of small square stones.

Tongue. A projecting part on the edge of a board, to be inserted in a groove ploughed in the edge of another.

Torus. A moulding composed of a round, with a small square fillet on one side.

Transom. The horizontal piece framed across a double lighted window.

Trellis work. Reticulated or net-like framing, made of thin bars of wood.

Tripod. A three-legged seat, from which the priests of antiquity delivered their oracles, and frequently

represented in architectural ornaments.

Tympanum. The flat triangular sunk face in a pediment.

V

Valley. The internal angle of two inclined sides of a roof.

Vault. An interior concavity extending over two parallel opposite walls.

Venetian door. A door lighted on each side.

Venetian window. A window having three separate apertures.

Ventiduct. A passage or place for wind or fresh air.

Vermiculated rustics. Stones worked or tooled so as to appear as if eaten by worms.

Volute. The scroll or principal ornament of the Ionic capital.

W

Wainscoting, in joinery. The lining of walls, most of panelled work.

Weather boarding. Boards lapped and nailed upon each other so as to prevent rain or drift from passing through.

PART II.

The following TABLES and MEMORANDA have been collected from various sources, and are here brought together for the convenience of reference.

NOTE.

THE FOLLOWING WILL EXPLAIN THE CHARACTERS USED IN THIS WORK.

= EQUAL.	The sign of Equality; as 4 qrs. = 1 cwt.; signifies that 4 qrs. are equal to 1 cwt.
— MINUS, OR LESS.	The sign of Subtraction; as 8 — 2 = 6; that is, 8 less 2 is equal to 6.
+ PLUS, OR MORE.	The sign of Addition; as 4 + 4 = 8; that is, 4 added to 4 is equal to 8.
× MULTIPLIED BY.	The sign of Multiplication; as 4 × 4 = 16; that is, 4 multiplied by 4 is equal to 16.
÷ DIVIDED BY.	The sign of Division; as 8 ÷ 2 = 4; that is, 8 divided by 2 is equal to 4.
: IS TO :: SO IS : TO	The signs of Proportion; as 2 : 4 : : 8 : 16; that is, as 2 is to 4 so is 8 to 16.
7 — 2 + 5 = 10	Shows that the difference between 7 and 2 added to 5 is equal to 10.
3^2	Signifies that the square of 3 is required; as 3 × 3 = 9.
4^3	Signifies that the cube, or third power of 4, is required; as 4 × 4 × 4 = 64.
$\surd$	Prefixed to any number, signifies that the Square Root of that number is required; as $\surd 9 = 3$.
$\sqrt[3]{}$	Signifies that the Cube Root, or root of the third power is required; as $\sqrt[3]{64} = 4$.

ANALYSIS

OF

PRACTICAL SCIENCE.

WEIGHTS AND MEASURES.

TROY WEIGHT.

24 grains make one pennyweight. 20 pennyweights make one ounce.
12 ounces make one pound.

AVOIRDUPOIS WEIGHT.

16 drachms	make 1 ounce.	4 quarters	make 1 cwt.
16 ounces	1 pound.	20 cwt.	1 ton.
28 pounds	1 quarter.		

N. B.—5760 Troy grains make 1 pound Troy, and 7000 Troy grains 1 pound Avoirdupois; hence 175 pounds Troy are equal to 144 pounds Avoirdupois.

APOTHECARIES' WEIGHT.

20 grains	make 1 scruple.	8 drachms	make 1 ounce.
3 scruples	1 drachm.	12 ounces	1 pound.

CLOTH MEASURE.

2¼ inches	make 1 nail.	3 quarters	make 1 Flemish ell.
4 nails	1 quarter.	5 quarters	1 English ell.
4 quarters	1 yard.	6 quarters	1 French ell.

LONG MEASURE.

12 inches	make 1 foot.	40 poles	make 1 furlong.
3 feet	1 yard.	8 furlongs	1 mile.
6 feet	1 fathom.	3 miles	1 league.
5½ yards	1 rod, pole, or perch.	60 miles	1 degree.

WINE MEASURE.

2 pints	make 1 quart.	42 gallons	make 1 tierce.
4 quarts	1 gallon.	63 gallons	1 hogshead.
10 gallons	1 anker.	2 hogsheads	1 pipe or butt.
18 gallons	1 rundlet.	2 pipes	1 tun.

ALE AND BEER MEASURE.

2 pints	make 1 quart.	2 kilderkins	make 1 barrel.
4 quarts	1 gallon.	1½ barrel	1 hogshead.
9 gallons	1 firkin.	2 barrels	1 puncheon.
2 firkins	1 kilderkin,	3 barrels	1 butt

N. B.—The pint, quart, and gallon, for wine, ale, and beer, and grain or corn, measure the same with regard to their magnitude; 8 of these gallons make one bushel; and 1 gallon contains 277·274 cubical inches, or 10 lbs. of distilled water, at 62 degrees.

GRAIN OR CORN MEASURE.

2 pints	make 1 quart.	2 bushels	make 1 strike.
2 quarts	1 pottle.	4 bushels	1 coomb.
4 quarts	1 gallon.	2 coombs	1 quarter.
2 gallons	1 peck.	5 quarters	1 wey or load.
4 pecks	1 bushel.	2 weys	1 last of corn.

COAL MEASURE.

4 pecks	make 1 bushel.	12 sacks	make 1 chaldron.
3 bushels	1 sack.	21 chaldrons	1 score.

CUBIC OR SOLID MEASURE.

1728 cubic inches = 1 cubic foot.
46656 cubic inches = 27 cubic feet = 1 cubic yard.

SQUARE MEASURE.

144 inches	make 1 foot.	4 roods	make 1 acre of land.
9 feet	1 yard.	640 acres	1 square mile.
272¼ feet	1 rod, pole, or perch.	30 acres	1 yard of land
40 rods	1 rood.	100 acres	1 hide of land.

HAY AND STRAW.

1 truss of new hay = 60 lbs.	1 truss of straw = 36 lbs.
1 truss of old hay = 56 lbs.	36 trusses = 1 load.

PAPER.

20 quires make 1 ream.	12 skins of parchment = 1 roll.
2 reams 1 bundle.	

SIZES OF DRAWING PAPER

Wove antique	4 ft. 4 × 2 ft. 7	Imperial	2 ft. 5 × 1 ft. 9½
Double elephant	3 ft. 4 × 2 ft. 2	Super royal	2 ft. 3 × 1 ft. 7
Atlas	2 ft. 9 × 2 ft. 2	Royal	2 ft. 0 × 1 ft. 7
Columbier	2 ft. 9¾ × 1 ft. 11	Medium	1 ft. 10 × 1 ft. 6
Elephant	2 ft. 3¾ × 1 ft. 10½		

MISCELLANEOUS INFORMATION.

1 tun of hock contains	36 gallons.
1 barrel, imperial measure	9981·864 cubic inches.
anchovies	30 pounds.
soap	256 pounds.
herrings	32 gallons.
Salmon or eels	42 gallons.
1 bushel, imperial measure	2218·192 cubic inches.
Winchester measure	2150·42 cubic inches.
coal	88 pounds.
flour	56 pounds.
1 butt of sherry	130 gallons.
1 chaldron of coals, with ingrain	104809·572 cubic inches.
without ingrain	99818·64 cubic inches.
at Newcastle, is	53 cwt.
8 chaldrons of coals at Newcastle are equal to	15½ London chaldrons.
1 clove of wool	7 pounds.
1 firkin of butter	56 pounds.
soap	64 pounds.
soap	8 gallons.
1 fodder of lead, at Stockton	22 cwt.
Newcastle	21 cwt.
London	19½ cwt.
1 gallon, imperial measure	277·274 cubic inches.
imperial measure distilled water at 62°	10 pounds.
former wine measure	231 cubic inches.
former ale measure	282 cubic inches.
Irish measure	2176 cubic inches.
1 gross	12 dozen.
1 great gross	12 gross.
1 hand	4 inches.
1 hogshead of claret	58 gallons.
tent	63 gallons.
1 hundred of salt	8 lasts.
1 keg of sturgeon	4 or 8 gallons.
1 last of salt	18 barrels.
gunpowder	24 barrels.
beer	12 barrels.
potash	12 barrels.
cod-fish	12 barrels.
herrings	12 barrels.
meal	12 barrels.
soap	12 barrels.
pitch and tar	12 barrels
flax	17 cwt.
feathers	17 cwt.
wool	4368 pounds.
1 pack of wool	240 pounds.
1 palm	3 inches.
1 pipe of Madeira	110 gallons.
Cape Madeira	110 gallons.

1 pipe of Teneriffe	120 gallons.
Bucellas	140 gallons.
Barcelona	120 gallons.
Vidonia	120 gallons.
Mountain	120 gallons.
Port	138 gallons.
Lisbon	140 gallons.
1 pole, Woodland	18 feet.
Plantation	21 feet.
Cheshire	24 feet.
1 sack of wool	364 pounds.
1 seam of glass	124 pounds.
1 span	9 inches.
1 stone of meat or fish	8 pounds.
1 tun of vegetable oil	236 gallons.
animal oil	252 gallons.
1 tod of wool	28 pounds.
1 wey of wool	182 pounds.

IMPERIAL WEIGHTS AND MEASURES.

In establishing the English imperial weights and measures, it was enacted, That a cubic inch of distilled water in a vacuum weighed by brass weights, also in a vacuum at the temperature of sixty-two degrees of Fahrenheit's thermometer, is equal to two hundred and fifty-two grains, and seven hundred and twenty-four thousandth part of a grain.

And, that the standard measure of capacity, as well for liquids as for dry goods not measured by heaped measure, should be the gallon containing ten pounds avoirdupois weight of distilled water, weighed in air, at the temperature of sixty-two degrees of Fahrenheit's thermometer, the barometer being at thirty inches, to be used as well for wine, beer, ale, spirits, and all sorts of liquids, as for dry goods not measured by heaped measure; and eight such gallons to be a bushel, and eight such bushels a quarter of corn or other dry goods, not measured by heaped measure.

And, that the standard measure of capacity for coals, culm, lime, fish, potatoes, or fruit, and all other goods and things commonly sold by heaped measure, should be the aforesaid bushel, containing eighty pounds avoirdupois of water as aforesaid; the same being made round with a plain and even bottom, and being nineteen inches and half from outside to outside of the standard measure, to be ascertained in the following manner:—

Take a pendulum which will vibrate seconds in London, on a level of the sea, in a vacuum; divide all that part thereof which lies between the axis of suspension and the centre of oscillation into 391393 equal parts; then will ten thousand of such parts be an imperial inch, twelve whereof make a foot, and thirty-six whereof make a yard.

Take a cube of one such inch of distilled water, at 62 deg. of temperature, by Fahrenheit's thermometer; let this be weighed by any weight, and let such weight be divided into 252458 equal parts, then will one thousand of such parts be a troy grain; and seven thousand of these grains will be a

pound avoirdupois, the operation having been performed in air. Ten pounds, such as those mentioned, of distilled water, at 62 dg. of temperature, will be a gallon, which gallon will contain two hundred and seventy-seven cubic inches, and two hundred and seventy-four one thousandth parts of another cubic inch.

IMPERIAL AND OLD MEASURES.

The subjoined Table represents the relative value of the Imperial and Old Measures.

IMPERIAL WINE GALLON.

Imp. gallon,	1	2	3	4	5	6	7	8	9
Old gallon,	1·200	2·401	3·601	4·801	6·002	7·202	8·402	9·602	10·303

IMPERIAL ALE GALLON.

Imp. gallon,	1	2	3	4	5	6	7	8	9
Old gallon,	0·983	1·966	2·950	3·933	4·916	5·899	6.883	7·866	8·849

IMPERIAL CORN BUSHEL.

Imp. gallon,	1	2	3	4	5	6	7	8	9
Old gallon,	1·031	2·063	3·095	4·126	5·158	6·189	2·221	8·252	9·284

OLD WINE GALLON.

Old gallon,	1	2	3	4	5	6	7	8	9
Imp. gallon,	0·833	1·666	2·499	3·332	4·166	4·999	5·832	6·665	7·498

OLD ALE GALLON.

Old gallon,	1	2	3	4	5	6	7	8	9
Imp. gallon,	1·017	2·034	3·051	4·068	5·085	6·102	7·119	8·136	9·153

OLD CORN BUSHEL.

Old gallon,	1	2	3	4	5	6	7.	8	9
Imp. gallon,	0·969	1·939	2·908	3·878	4·847	5·817	6·786	7·755	8·725

TROY AND AVOIRDUPOIS WEIGHT.

The subjoined Table represents the relative value of the Troy and Avoirdupois Pounds.

Troy lb.	1	2	3	4	5	6	7	8	9
Avoir. lb.	0·823	1·646	2·469	3·291	4·104	4·937	5·760	6·583	7·406
Avoir. lb.	1	2	3	4	5	6	7	8	9
Troy lb.	1·215	2·431	3·646	4.861	6·076	7·292	8·507	9·722	10·937

SCOTTISH WEIGHTS AND MEASURES.

The subjoined Table represents the relative value of the Imperial and the Old Scottish Weights and Measures.

STANDARD SCOTS PINTS

Scots pints,	1	2	3	4	5	6	7	8	9
Imp. gallon,	0·374	0·749	1·123	1·497	1·872	2·246	2·620	2·994	3·369

WHEAT FIRLOTS.

Wheat firlot,	1	2	3	4	5	6	7	8	9
Imp. bushel,	0·991	1·981	2·972	3·962	4·953	5·944	6·934	7·925	8·915

BARLEY FIRLOTS.

Barley firlot,	1	2	3	4	5	6	7	8	9
Imp. bushel,	1·445	2·890	4·335	5·781	7·226	3·671	10·116	11·561	13·006

SCOTTISH TROY POUNDS.

S. Troy lbs.	1	2	3	4	5	6	7	8	9
Avoir. lbs.	1·089	2·178	3·266	4·355	5·444	6·533	7·622	8·711	9·799

OLD TRON POUNDS.

Tron lbs.	1	2	3	4	5	6	7	8	9
Avoir. lbs.	1·429	2·858	4·287	5·716	7·145	8·575	10·004	11·433	12·862

GLASGOW TRON POUUDS.

Tron lbs.	1	2	3	4	5	6	7	8	9
Avoir. lbs.	1·406	2·812	4.219	5 625	7·031	8·437	9·844	11·250	12·656

STANDARD SCOTS ELLS.

Scots Ells,	1	2	3	4	5	6	7	8	9
Imp. yards,	1·033	2·066	3·100	4·133	5·166	6·200	7·233	8·266	9·999

STANDARD SCOTS ARCHES.

Scots arches,	1	2	3	4	5	6	7	8	9
Eng. arches,	1·271	2·541	3·212	5·083	6·354	7·624	8·895	10·166	11·437

IMPERIAL GALLONS.

Imp. gal.	1	2	3	4	5	6	7	8	9
Scots pts.	2·681	5·363	8·044	10·726	13·407	16·089	18·770	21·452	24·137

IMPERIAL BUSHELS.

Imp. bushel,	1	2	3	4	5	6	7	8	9
Wheat firlots,	1·009	2·019	3·028	4·038	5·048	6·057	7·066	8·076	9·085

IMPERIAL BUSHELS.

Imp. bushel,	1	2	3	4	5	6	7	8	9
Barley firlots,	0·692	1·384	2·076	2·768	3·460	4·152	4·844	5·536	6·228

AVOIRDUPOIS POUNDS.

Avoir. lbs.	1	2	3	4	5	6	7	8	9
S. Troy lbs.	0·918	1·837	2·755	3·674	4·592	5·510	6·429	7·347	8·266
Avoir. lbs.	1	2	3	4	5	6	7	8	9
Tron lbs.	0·700	1·399	2·099	2·799	3·499	4·198	4·898	5·598	6·298
Avoir. lbs.	1	2	3	4	5	6	7	8	9
G. Tron lbs.	0·711	1·422	2·133	2·844	3·556	4·267	4·978	5·689	6·400

IMPERIAL YARDS.

English yds.	1	2	3	4	5	6	7	8	9
Scots ells,	0 968	1·935	2·903	3 871	4·839	5.806	6·774	7·742	8.711

ENGLISH ACRES.

English acres,	1	2	3	4	5	6	7	8	9
Scots acres,	0·787	1·574	2·361	3·148	3·935	4·722	5·509	6·295	7·082

APPLICATION OF THE PRECEDING TABLES.

RULE. — In the preceding Tables the comparison is made in whole numbers and decimal parts; and although these Tables exhibit the value of units only, the value of tens, hundreds, thousands, &c., may be found, by bringing forward as many of the decimals to the whole number as there are noughts or ciphers in the numbers sought.

EXAMPLE. — Required the number of Scots acres in 6542 English acres.

6000	=	4722
500	=	393·5
40	=	31·48
	=	1·574
Ans.		5148·554

That is, 6542 English acres are equal to 5148½ Scottish acres.

TABLE I.

BRITISH AND FOREIGN WEIGHTS AND MEASURES.

Showing the relative value of British and Foreign Avoirdupois Weights and Wine Measure.

NAMES OF PLACES.	AVOIRDUPOIS WEIGHT.		WINE MEASURE.	
	Names of Weights.	Number equal to 112 lb. Avoir.	Names of Measures.	English Imperial Gallons.
Amsterdam.	Pound, old weight	102·819	Wine Stekan	4·270
	———, Flemish	50·796	Brandy Stekan	4·129
			Beer Stekan	4·327
Antwerp		——	Stoop	·605
Berlin.	Pound	108·421	Anker	8·243
Bourdeaux		——	Barrique	50·610
			Velte	1·580
Bremen	Pound	101·950		
Brunswick	Pound	108·798		
China	Catty	84·002		
Cologne	Pound	108·646	Viertel	1·316
Constantinople	Oke .	39·536	Almud	1·151
Copenhagen.	Pound	101·553	Viertel	1·700
			Anker	8·287
Dantzic		——	Ohm	32·968
Dresden		——	Eimer	14·888
Dunkirk		——	Lot	·507
England	Pound	112·000	Wine Gallon	1·000
			Beer Gallon	——
Florence	Libbra	149·609	Wine Barile	10·032
			Oil Barile	7·357
France	Livre, Poids de Marc	103·771	Hetier	1·638
	Kilogramme	51·796	Sectolitre	22·010
	Livre Usuelle	101·593		
Geneva	Heavy Pound	92·256	Setier	9·954
	Light Pound	110·709		
Genoa	Libra, Peso Grosso	145·697	Wine Barile	16·337
	Libra, Peso Sottile	160·261	Oil Barile	14·231
Hamburg	Pound	104·868	Ahm	31.866
Hanover	Pound	104·378	Ahm	34·237
Ireland		——	Gallon	·784
Leghorn	Libbra	149·609	Wine Barile	10·032
			Oil Barile	7·357
Leipsic		——	Eimer	16·747
Lisbon		——	Almude	3·641
Lyons	Livre, Poids de Soie	110·617		
	Livre, Poids de Table	118·518		
Naples	Cantaro Grosso . .	56·987	Wine Barile	9·175

NAMES OF PLACES.	AVOIRDUPOIS WEIGHT.		WINE MEASURE.	
	Names of Weights.	Number equal to 112 lb. Avoir.	Names of Measures.	English Imperial Gallons.
	Cantaro Piccolo	105·660	Oil Salma	35·643
Netherlands	New Pound	50·796	Vat	22·010
Oporto		——	Almude	5·611
Persia	Batman of Cherray	88·316		
	Batman of Tauris	176·634		
Poland	Cracow Pound	125·440	Garniec	·349
	Warsaw Pound	134·430		
	New Pound	125·721		
Portugal	Arratel	110·687		
Prussia	Pound	108·617	Eimer	15·117
Riga	Pound	121·512		
Rochelle		——	Wine Barrique	38·356
			Brandy Velte	1·608
Rome	Libbra	149·790	Wine Barrile	12·841
			Oil Barrile	12·651
Rotterdam	Pound	102·819		
	Light Pound	108·242	Ahm	33·319
Rouen	Livre, Poids de Vicomte	95·134	Barrique	43·062
Russia	Pound	124·079	Vedro	2·696
Sardinia	Libbra	127·999		
Scotland	Pound, Dutch weight	103·157	Pint	·372
Sicily	Rottolo Grosso	58·181		
	Rottolo Sottile	64·000		
	Libbra	159·999		
Smyrna	Oke	39·536		
Spain	Libra	110·406	Wine Arroba	3·537
			Oil Arroba	2·780
Sweden	Pound, Victualic w't.	119·456	Kann	·576
	——, Miner's weight	135·148		
	——, Uppstads, or Inland Town wt.	141·874		
	——, Metal, or Staplestad weight	149·333		
Venice	Libbra, Peso Grosso	106·772	Seechio	2·377
	Libbra, Peso Sottile	108·601	Oil Miro	3·356
	Libbra, Nuova	50·796		
Vienna	Pound	90.688	Eimer	12·418
Zurich	Heavy Pound	96·337	Land Maass	·401
	Light Pound	139·108	City Maass	3·61
			Oil Maass	3·02

TABLE II.

Showing the relative value of British and Foreign Long and Corn Measures.

NAMES OF PLACES.	LONG MEASURE.		CORN MEASURE.	
	Names of Measures.	Number of each equal to 100 Eng. feet.	Names of Measures.	Contents in Imperial Bushels.
Amsterdam	Foot	107·719	Mudde	3·060
	Rhineland Foot	97·166		
Antwerp	Foot	106·761	Hectolitre	2·750
Berlin	Foot	98·441	Scheffel	1·434
Boulogne		——	Setier	4·748
Bourdeaux		——	Boiesseau	2.110
Brest		——	Tonneau	37·956
Bruges		——	Hoed	4·582
Cadiz		——	Fanega	1·550
China	Mathematical Foot	91·463		
	Builder's Foot	94·414		
	Tradesman's Foot	90·022		
	Land Surveyor's foot	95·389		
Cologne	Foot	110·803	Malter	4·458
Constantinople		——	Killow	·912
Copenhagen	Rhineland Foot	97·166	Toende	3·826
Dantzic	Foot	106·194	Scheffel	1·505
Dieppe			Mine	2·814
Dresden	Foot	107·719	Scheffel	2·910
Dunkirk		——	Sea Rasiere	4·121
			Land Rasaire	3.667
England	Foot	100·000	Bushel	1·000
Florence			Stajo	·670
France	Pide de Roi	93·896	Setier	4·292
	Metre	30·480	Hectolitre	2·750
			Boisseau usuel	·343
Francfort	Foot	106·382		
Geneva	Foot	62·467	Coupe	2·136
Genoa	Palmo	123·450	Mina	3·321
Groningen		——	Mudde	2·504
Haarlem		——	Sack	2·174
Hamburg	Foot	106·322	Scheffel	2·896
Hanover	Foot	104.803	Himtem	·855
Leghorn		——	Sacco	1·999
Leipsic	Foot	108·010		
	Builder's Foot	107·816		
Lisbon	Foot	92·735	Alqueire	·372
Lyons		——	Asnee	5·277
Malaga		——	Fanega	1·550
Marseilles		——	Charge	4·401
Moscow	Foot	91·116		
Naples	Palmo	115·606	Tomolo	1·407
Netherlands		——	Mudde	2·750

NAMES OF PLACES.	LONG MEASURE.		CORN MEASURE.	
	Names of Measures.	Number of each equal to 100 English feet.	Names of Measures.	Contents in Imperial Bushels.
Persia		———	Artaba	1·809
Poland		———	Korzec	1·407
Prussia	Rhineland Foot	97·166	Scheffel	1·511
Rhineland	Foot	97·166		
Riga	Foot	111·214	Loop	1·878
Rochelle		———	Boisseau	·904
Rome	Foot	102·389	Rubbio	8·101
Rotterdam		———	Sack	2·849
Rouen		———	Setier	4·922
Russia	Foot	87·272	Chetwert	5·770
Sardinia	Palmo	122·699		
Sicily	Palmo	125·918	Salma Grossa	9·472
			Salma Generale	7·611
Smyrna		———	Killow	1·411
Spain	Foot	107·913	Fanega	1·546
Strasburgh	Foot	105·355		
	Land Foot	103·270		
Sweden	Foot	102·739	Tunna of 32 Kappar	4·030
			Kann	0.071
Turin	Foot	94·339		
Venice	Foot	87·719	Stajo	2·201
Vienna	Foot	96·385		
Zurich	Foot	101·608	Mutt	2·275

TABLE III.

Showing the relative value of British and Foreign Square and Cube Measures.

NAMES OF PLACES.	SQUARE MEASURE.	CUBIC MEASURE.	NAMES OF PLACES.	SQUARE MEASURE.	CUBIC MEASURE.
	English Sq. Inches.	English Cubic Inches.		English Sq. Inches.	English Cubic Inches.
Amsterdam	124·255	1385·070	Hamburgh	127·441	1438·684
Antwerp	126·337	1420·027	Hanover	131·194	1502·696
Berlin	148·693	1813·162	Lisbon	167·547	2168·728
Bremen	129·508	1473·755	Milan	143·984	3811·030
Cologne	117·288	1270·229	Munich	129·390	1471·811
Dantzic	127·690	1442·897	Rhineland	152·670	1886·390
Dresden	124·099	1382·463	Riga	116·424	1256·215
England	144·000	1728·000	Rome	137·358	1609·835
France	—	2091·743	Spain	123·832	1378·002
Cubic decim.	—	61·028	Sweden	136·515	1595·041
Pied de roi	163·558	—	Turin	161·798	2058·070
Square Metre	1550·075	—	Venice	187·142	2560·102
Geneva	369·024	7088·951	Vienna	155·002	1929·774
			Zurich	139·476	1647·211

TABLE IV.

Showing the relative value of British and Foreign Land Measures.

NAMES OF PLACES.	Names of Measures.	English Square Yards.	NAMES OF PLACES.	Names of Measures.	English Square Yards.
Amsterdam	Morgen	9722	Nuremberg	Meadow Morgen	2544
Basil	Juchart	3816	Portugal	Geira	6970
Berlin	Great Morgen	6786	Prussia	Morgen	3053
	Little Morgen	3054	Rhineland	Morgen	10185
Berne	Wood Juchart	4632	Rome	Pezza	3158
Canary Isles	Fanegada	2422	Russia	Dessetina	13066·6
Dantzic	Morgen	6650	Saxony	Acre	6590
England	Acre	4840	Scotland	Acre	6150
France	Hectare	1960	Spain	Fanegada	5500
Geneva	Arpent	6179		Arranzada	4653
Hamburgh	Scheffel of Corn Land	5022	Sweden	Tunneland	5900
	Morgen	11545	Switzerland	Faux	7855
Hanover	Morgen	3100	Tuscany	Quadrato	4074
Ireland	Acre	7840	Vienna	Joch	6889
Naples	Moggia	3998	Zurich	Common Acre	3825·6
Netherlands	Vierkantebunder	1196		Wood Acre	4306
Nuremberg	Corn Land Morgen	5654		Meadow Acre	3445

TABLE V.

Showing the relative value of British and Foreign Road Measures.

NAMES OF PLACES.	Measure.	Number equal to 100 Eng. miles.
Arabia	Mile	81·936
Brabant	League	28·966
China	Li	278·481
Dantzic	Mile	20·767
Denmark	Mile	21·348
England	Mile	100·
	Mile, Geographical,	86·913
Flanders	League	25·641
France	Kilometre	161·024
	League of 2000 Toises	41·285
	League of 25 to the Degree	36·214

NAMES OF PLACES.	Measure.	Numbers equal to 100 English miles.
	League, Marine	28·966
Germany	Mile, Geographical	21·725
	Mile, Long	17·381
	Mile, Short	25·659
Hamburg	Mile	21·348
Hanover	Milé	15·226
Holland	Mile	21·725
Hungary	Mile	19·313
Ireland	Mile	78·571
Netherlands	Mile, Metrical	161 024
Persia	Parasang	28·918
Poland	Mile, Long	21·725
	Mile, Short	28·966
Portugal	League	26·035
Prussia	Mile	21·367
Rome	Mile	108·108
	Mile, Metrical	161·024
	Mile, Geographical	86·913
Russia	Werst	150·814
Scotland	Mile	88·709
Spain	League, Common	23·732
	League, Judicial	37·972
Sweden	Mile	15·042
Switzerland	Mile	19·228
Tuscany	Mile	97·345
Turkey	Berri	96·385

TABLE VI.

Showing the relative value of French and English Weights and Measures.

DECIMAL SYSTEM.

LONG MEASURE.

French.		*English.*
Millimetre	=	0·03937 Inches.
Centimetre	=	0·39371 Inches.
Decimetre	=	3·93710 Inches.
Metre	=	39·37100 Inches.
Decametre	=	32·80916 Feet.
Hectometre	=	328·09167 Feet.
Kilometre	=	1093·6389 Yards.
Myriametre	=	10936·38900 Yards, or 6 Miles, 1 Furlong, 28 Poles.

METALS. Continued.	Weight of a cubic foot in ounces.	Weight of a cubic foot in pounds.	Weight of a cubic inch in pounds.
Gold, the same hammered	15·589	974·4	0·564
20 carats, fine, trinket	15·709	982·0	0·568
the same hammered	15·775	986·0	0·570
Iron, cast	7·207	450·5	0·260
bars	7·788	486·8	0·281
pyrites, cubic	4·702	294·0	0·170
radiated	4·775	298·5	0·173
dodecahedral	4·830	302·0	0·175
from Freyberg	4·682	292·6	0·170
from Cromwall	4·789	299·4	0.173
ore, specular	5·218	326·1	0·189
micaceous	5·070	317·0	0·184
prismatic	7·355	459·8	0·266
Lead, cast	11·352	709·5	0·410
litharge	6·300	393·8	0·228
ore, cubic	7·587	474·2	0·274
horned	6·072	379·5	0·220
corneous	6·065	379·1	0·220
reniform	3·920	245·0	0·142
blue	5·461	341·4	0·198
black	5·770	360·6	0·210
brown	6·974	436·0	0·252
white	7·236	452·2	0·261
red, or red lead spar	6·027	376·8	0·219
yellow, molybdenated	11·352	709·5	0·410
Mercury, solid, 40 deg. below 0 Fahr.	15·632	977·0	0·566
at 32 deg. of heat.	13·619	851·2	0·493
at 60 deg.	13·580	848·8	0·491
at 212 deg.	13·375	836·8	0·484
Nickle, cast	7·807	388·0	0·282
ore, called Kupper-nickle of Saxe	6·648	415·5	0·240
of Bohemia	6·207	388·0	0·225
Platina, crude, in grains	15·692	975·1	0·570
purified	19·500	1218·8	0·706
the same hammered	20·337	1271·1	0·736
rolled	22·069	1379·4	0·799
wire-drawn	21·042	1315·1	0·773
Silver, cast, pure	10·474	654·6	0·379
cast, pure, hammered	10·511	657·6	0·381
Parisian standard	10·175	636·0	0·368
the same hammered	10·376	648·5	0·375
French coin	10·048	628·0	0.364
the same hammered	10·408	650·5	0·376
shilling, George III.	10·534	658·4	0·380
Steel, soft	7·833	489·6	0·283
hardened, but not tempered	7·840	400·0	0·283
tempered, but not hardened	7·816	488·5	0·283
tempered and hardened	7·818	488·6	0·283
Tin, pure Cornish	7·291	455·6	0·263
the same hardened	7·299	456·0	0·263

METALS. Continued.	Weight of a cubic foot in ounces.	Weight of a cubic foot in pounds.	Weight of a cubic inch in pounds.
Tin, Molacca, fused	7·296	456·0	0·263
hardened	7·307	456·8	0 263
ore, red	6·935	433·5	0·250
black	6·901	431·4	0·250
white	6·008	375·5	0·221
Tungsten	6·066	379·1	0·220
Uranium	6·440	402·5	0·232
Wolfram	7·119	445·0	0·257
Zinc, in its usual state	6·862	429·0	0·248
pure and compressed	7·191	449·5	0·259
formed by sublimation, and full of cavities	5·918	269·9	0·156
sulphate of	1·900	118·8	0·069
saturated solution, temperature 42 deg.	1·386	86·6	0·050
WOODS.			
Alder	·800	50·0	0·029
Apple tree	·793	49·6	0·029
Ash	·845	52·9	0·031
Bay tree	·822	51·4	0·029
Beech	·852	53·2	0·031
Box, Dutch	·912	57·0	0·033
French	1·328	83·0	0·048
Brazilian, red	1·031	64·5	0·037
Campechy	·913	57·1	0·033
Cedar, American	·561	35·1	0·020
Indian	1·315	82·2	0·047
Palestine	·613	38·4	0·022
Wild	·596	37·2	0·021
Cherry tree	·715	44·8	0·026
Citron	·726	45·4	0·026
Cocoa	1·040	65·0	0·037
Cork	·240	15·0	0·009
Cypress	·644	40·2	0·023
Ebony, Indian	1·209	75·6	0·044
American	1·331	83·2	0·048
Elder	·695	43·5	0·025
Elm	·671	42·0	0·024
Filbert	·600	37·5	0·021
Fir, yellow	·657	41·1	0·023
white	·569	35·6	0·021
male	·550	34·4	0·019
female	·498	31·1	0·018
Hazel	·600	37·5	0·021
Jasmin, Spanish	·770	48·1	0·028
Juniper	·556	34·8	0·020
Lemon tree	·703	44·0	0·025
Lignumvitæ	1·333	83·4	0·048
Lime tree	·604	37·8	0.022
Logwood	·913	57·1	0·033
Mahogany	1·063	66·5	0·038

WOODS. Continued.	Weight of a cubic foot in ounces.	Weight of a cubic foot in pounds.	Weight of a cubic inch in pounds.
Maple	·750	47·0	0·027
Mastic tree	·849	53·1	0·031
Medlar	·941	59·0	0·034
Mulberry	·897	56·1	0·032
Oak, heart of, 60 years old	1·170	73·1	0·043
dry	·932	58·2	0·033
Olive tree	·927	58·0	0·033
Orange tree	·705	44·1	0·025
Pear tree	·661	41·4	0.024
Pomegranate tree	1·354	84·6	0·049
Poplar	·383	24·0	0·014
white, Spanish	·529	33·1	0·019
Plum tree	·755	47·2	0·027
Quince tree	·705	44·1	0·025
Sassafras	·482	30·1	0·017
Vine	1·327	83·0	0·048
Walnut	·671	42·0	0·024
Willow	·585	36·6	0·021
Yew, Spanish	·807	50·5	0·029
Dutch	·788	49·2	0·028
STONES, EARTHS, &c.			
Alabaster, yellow	2·699	168·8	0 098
stained brown	2·744	171·5	0·099
veined	2·691	168·2	0·098
Dalias	2·611	163·2	0·095
Malaga	2·876	179·8	0·104
Malta	2·699	168·8	0·098
Oriental white	2·730	170·6	0·099
semi-transparent	2·762	172·6	0·100
Piedmont	2·693	168·4	0·098
Spanish Saline	2·713	169·6	0·099
Volencia	2·638	164·9	0·096
Ambergris	·926	58·0	0·033
Amianthus, long	·909	57·0	0·033
short	2·313	144·6	0·084
Asbestos, ripe	2·578	161·1	0·094
starry	3·073	192·1	0·111
Borax	1·714	107·1	0·062
Brick, earth	2·000	125·0	0·073
Chalk, British	2·784	174·0	0·100
Biancon, course	2·727	170·5	0·098
Spanish	2·790	174·4	0·100
Coal, Cannel	1·270	79·4	0·046
Newcastle	1·270	79·4	0·046
Staffordshire	1·240	77·5	0·045
Scotch	1·300	81·2	0·047
Cutler's stone	2·111	132·0	0·076
Emery	4·000	250·0	0·144
Flint, black	2·582	162·0	0·094

STONES, EARTHS, &c. Continued.	Weight of a cubic foot in ounces.	Weight of a cubic foot in pounds.	Weight of a cubic foot in pounds.
Flint, veined	2·612	163·2	0·095
white	2·594	162·1	0·094
Egyptian	2·565	160·4	0·093
Glass, flint	2·933	170·9	0·099
white	2·892	168·2	0·098
bottle	2·732	170·8	0·099
green	2·642	165·1	0·096
St. Gobin	2·488	155·5	0·090
Leith, crystal	3·189	199·4	0·116
fluid	3·329	208·1	0·120
Granite, Aberdeen, blue kind	2·625	164·1	1·095
Cornish	2·662	166·4	0·096
Egyptian, red	2·654	165·9	0·096
grey	2·728	170·5	0·099
beautiful red	2·761	172·6	0·100
Girardmor	2·716	169·8	0·098
violet, of Gyromagny	2·685	168·0	0·098
Dauphiny, red	2·643	165·2	0·096
green	2·684	167·8	0·098
radiated	2·668	166·8	0·097
Semur, red	2·638	164·9	0·096
Bretagne, grey	2·738	171·1	0·098
yellowish	2·619	162·8	0·095
Carintia, blue	2·956	184·8	0·107
Grindstone	2·143	134·0	0·077
Gypsum, opaque	2·168	135·5	0·077
semi-transparent	2·306	144·1	0·083
fine ditto	2·274	142·1	0·082
cuneiform, crystallized	2·306	144·1	0·083
rhomboidal	2·311	144·5	0·083
ditto, ten faces	2·312	144·5	0·083
Hone, white, razor	2·876	179·8	0·104
Jet, a bitumous substance	1·259	78·8	0·046
Limestone, green	3·182	199·0	0·116
arenaceous	2·742	171·4	0·098
white fluor	3·156	197·2	1·014
compact	2·720	170·0	0·098
foliated	2·837	177·4	0·102
granular	2·800	175·0	0·101
Manganese	7·000	437·5	0·252
grey ore, striated	4·756	207·2	0·172
grey foliated	3·742	234·0	0·135
red, from Kapnick	3·233	202·1	0·117
black	3·000	187·5	0·108
scaly	4·116	257·2	0·149
sulphate of	3·950	246·9	0·142
phosphate of	2·600	162·5	0·094
Marble, African	2·708	169·2	0·098
Biscayan, black	2·695	168·5	0·098
Brocatelle	2·650	165·6	0·097

STONES, EARTHS, &c. — Continued.	Weight of a cubic foot in ounces.	Weight of a cubic foot in pounds.	Weight of a cubic inch in pounds.
Marble, Campanian, green	2·742	171·4	0·099
Carrara, white	2·717	169·9	0·098
Castilian	2·700	168·8	0·098
Egyptian, green	2·668	166·8	0·097
French	2·649	165·6	0·098
Grenada, white	2·705	169·1	0·097
Italian, violet	2·858	166·1	0·097
Norwegian	2·728	170·5	0·099
Parian, white	2·838	164·9	0·096
Pyrenean	2·726	170·4	0·098
Red	2·724	170·2	0·098
Roman, violet	2·755	172·2	0·099
Siberian	2·718	169·9	0·098
Siennian	2·678	167·4	0·097
Switzerland	2·714	169·6	0·098
Valencia	2·710	169·4	0·098
Millstone	2·484	155·2	0·090
phosphoric	1·714	107·1	0·062
Porcelain, China	2·385	149·1	0·086
Limoges	2·341	146·4	0·084
Seves	2·146	134·1	0·077
British			
Porphyry, red	2·765	172·9	0·099
green	2·676	167·2	0·097
red, from Cordone	2·754	172·1	0·099
green, from ditto,	3·728	233·0	0·135
red, from Dauphiny	2·793	174·6	0·101
Pyrites, copper	4·954	309·6	0·180
ferruginous, cubic	3.900	241·2	0·140
round	4·101	256·4	0·149
of St Domingo	3·440	215·0	0·125
Salt	2·130	133·1	0·077
Serpentine, opaque, green, Italian	2·430	152·0	0·088
veined, black and olive	2·594	162·1	0·094
red and black	2·627	164·2	0·095
semi-transparent, grained	2·586	161·6	0·094
fibrous	3·000	187·5	0·108
from Dauphiny	2·669	167·0	0·097
Slate, common	2·672	167·0	0·097
new	2·854	178·4	0·104
black stone	2·186	136·6	0·079
fresh polished	2·766	173·0	0·099
Stalactite, opaque	2·478	154·9	0·090
transparent	2·324	145·2	0·084
Stone, Burford	2·049	128·1	0·075
common	2·520	157·5	0·091
Clicard, from Brachet	2·357	147·4	0·085
Ouchain	2·274	142·1	0·082
Notre Dame	2·378	148·6	0·085
Oriential blue	2·771	173·2	0·099

STONES, EARTHS, &c. — Continued.	Weight of a cubic foot in ounces.	Weight of a cubic foot in pounds.	Weight of a cubic inch in pounds.
Stone, paving	2·416	151·0	0·088
Portland	2·570	160·6	0·094
pomice	·915	57·2	0·033
Purbeck	2·631	162·6	0·094
prismatic basaltes	2·722	170·1	0·099
rag	2·470	154·4	0·090
rotten	1·981	124·0	0·071
rock of Chatillon	2·122	132·6	0·076
Siberian blue	2·945	184·1	0·107
St Cloud	2·201	137·6	0·079
St Maur	2·034	127·1	0·075
touch	2·415	151·0	0·088
Sulphur, native	2·033	127·1	0·075
melted	1·991	124·5	0·071
Talc, black	2·900	181·2	0·105
crayon	2·089	130·6	0·075
German	2·246	140·4	0·081
Muscovy	2·792	174·5	0·101
yellow	2·653	166·0	0·097
LIQUIDS.			
Acetic acid	1·007	63·0	0·036
Acetous acid, red	1·025	64·1	0·036
white	1·014	63·3	0·036
Alcohol, commercial	·837	52·3	0·031
highly rectified	·829	51·8	0·031
Ammonia, liquid	·897	56·1	0·033
muriate of	1·453	90·8	0·053
Beer, pale	1·023	68·0	0·040
brown	1·034	64·6	0·037
Benzoic acid	1·018	63·6	0·036
Cider	1·018	63·6	0·036
Ether, acetic	·866	54·1	0·032
muriatic	·730	45·6	0·026
nitric	·909	57·0	0·033
sulphuric	·739	46·2	0·026
Fluoric acid	1·500	93·8	0·054
Formic acid	·994	62·1	0·036
Milk of cows	1·032	64·5	0·037
Muriatic acid	1·194	74·6	0·044
Nitric acid	1·271	79·5	0·046
highly concentrated	1·583	99·0	0·057
Oil of Almonds, sweet	·917	57·4	0 033
Cloves, essential	1·036	64·8	0·037
Cinnamon, essential	1·044	65·2	0·037
Filberts	·916	57·2	0 033
Hempseed	·926	58·0	0·033
Lavender, essential	·894	36·0	0·032
Linseed	·940	58·8	0·034
Olives	·915	57·3	0·033

LIQUIDS.— Continued.	Weight of a cubic foot in ounces.	Weight of a cubic foot in pounds.	Weight of a cubic inch in pounds.
Oil of Poppies	·924	57·8	0·033
Rapeseed	·919	57·5	0·033
Turpentine, essential	·870	54·4	0·032
Whales	·923	57·8	0·033
Spirits of Wine, commercial	·837	52·4	0·030
highly rectified	·829	51·9	0·030
Sulphuric Acid	1·841	115·1	0·067
highly concentrated	2·125	133·0	0·077
Turpentine, liquid	·991	62·0	0·036
Vinegar, distilled	1·010	63·1	0·036
Water, rain	1·000	62·5	0·036
distilled	1·000	62·5	0·036
sea	1·026	64·1	0·037
Wine, Burgundy	·992	62·0	0·036
Bourdeaux	·994	62·1	0·036
Champaigne, white	·998	62·4	0·036
Canary	1·033	64·6	0·037
Constance	1·082	67·6	0·040
Madeira	1 038	64·8	0·038
Malaga	1·022	63·9	0·031
Port	·997	92·4	0·036
Tokay	1·054	65·9	0·039
RESINS, GUMS, ANIMAL SUBSTANCES.			
Ambergris	·926	58·0	0·034
Aloes, socotrine	1·380	86·2	0·050
hepatic	1·359	85·0	0·049
Assafœtida	1·328	83·0	0·048
Bark, Peruvian	·785	49·1	0·028
Beeswax, white	·969	60·6	0·036
yellow	·965	60·4	0·035
Butter	·942	59·0	0·034
Camphor	·989	62·0	0·036
Copal, Chinese	1·063	66·5	0·039
Madagascar	1·060	66·2	0·039
Opaque	1·140	71·2	0·041
Fat, Beef	·923	57·8	0·034
Mutton	·924	57·8	0·034
Veal	·934	58·4	0·034
Hog's	·937	58·6	0·034
Galbanum	1·212	75·8	0·044
Gambouge	1·222	76·4	0·044
Gum Ammoniac	1·207	75·5	0·044
Arabic	1·452	90·8	0·053
Bedellium	1·372	85·8	0·050
Euphorbia	1·124	70·2	0·041
Scammony of Aleppo	1·235	77·2	0·045
Smyrna	1·274	79·6	0·046
Seraphic	1·201	75·1	0·044
Tragacanth	1·316	82·2	0·047

RESINS, GUMS, &c. — Continued.	Weight of a cubic foot in ounces.	Weight of a cubic foot in pounds.	Weight of a cubic inch in pounds.
Gunpowder, in a loose heap	·836	52·2	0·030
shaken	·932	58·2	0·034
solid	1·745	109·1	0·063
Honey	1·450	90·6	0·053
Indigo	·769	48·1	0·028
Ivory	1·826	114·1	0·066
Lard	·948	59·2	0·034
Madder root	·765	47·9	0·027
Mastic	1·074	67·1	0·039
Myrrh	1·360	85·0	0·049
Olibanum	1·173	73·4	0·043
Opium	1·336	83·5	0·048
Scammony of Aleppo	1·235	77·2	0·045
Smyrna	1·274	79·6	0·046
Spermaceti	·943	59·0	0·034
Sugar, white	1·606	100·4	0·058
Tallow	·942	59·0	0·034
Tragacanth	1·316	82·2	0·047
Wax of Bees, white	·969	60·6	0·036
yellow	·965	60·4	0·036
Shoemakers	·897	56·1	0·032

GASES.

In the following Table the specific gravities of the principal Gases will be given as they correspond with the specific gravity of atmospheric air, which is supposed to be 1·000.

Atmospheric, or common air	1·000	Muriatic acid gas	1.278
Ammoniacal gas	·590	Nitrous gas	1·094
Arsenical hydrogen gas	·529	Nitrous acid gas	2·427
Azote	·969	Nitrous oxide	1·614
Carbonic acid	1·520	Oxygen, mean	1·104
Carbonic oxide	·960	Phosphuretted hydrogen	·870
Carburetted hydrogen	·491	Steam	·690
Chlorine	·470	Sulphuretted hydrogen	1·777
Chloro-carbonic gas	3·389	Sulphurous acid	2·193
Chloro-cyanic vapor	2·111	Vapor of alcohol	2·100
Cydrogen	1·806	absolute alcohol	1·613
Euchlorine	2·409	hydriotic ether	5·475
Fluoboracic	2·371	iodine	8·620
Fluosilicic acid gas	3·574	muriatic ether	2·219
Hygrogen	·074	oil of turpentine	5·013
Hydriodic acid gas	4·443	sulphuret of carb	2·645
Hydrocyanic vapor	·948	sulphuric either	2·586

APPLICATION.

RULE. — Find by the rules in the "Mensuration of Solids," the solidity of the material of which the weight is required, and multiply that solidity, by the factor in the foregoing table.

EXAMPLE 1. — Required the weight of a bar of iron, 12 feet long, and 1 inch square?

Weight of 1 inch bar iron, as per table 20, is 0·281.
12 feet = 144 inches.
Then ·281 × 144 inches = 40·464, or $40\frac{5}{10}$ or $40\frac{1}{2}$ lbs. nearly.

EXAMPLE 2. — Required the weight of a plank of yellow fir, 11 inches wide, 3 inches thick, and 20 feet long?
20 feet = 240 inches.
One cubic inch yellow fir, as per table, = 0·023; therefore ·023 × 240 × 11 × 3 = 182·160, or $182\frac{2}{10}$ or $182\frac{1}{5}$ lbs. nearly.

EXAMPLE 3. — Required the weight of a cube tank of cider, the side being 5 feet?
Weight of 1 cubic foot of cider = 63·6 lbs.; therefore 63·6 × 5 × 5 × = 7950 lbs., or 3 tons, 11 cwt. nearly.

STRENGTH OF MATERIALS.

ADHESION OF NAILS.

Every carpenter is familiar with the use of the nail, and possesses a practical knowledge, more or less accurate, of the force of adhesion of different nails, and in different substances, so as to decide, without difficulty, what number, and of what length, may be sufficient to fasten together substances of various shapes, and subject to various strains. But, interesting as this subject unquestionably is, it has not been till very recently that the necessary experiments have been made to determine, 1st, the adhesive force of different nails when driven into wood of different species, 2d, the actual weight, without impulse, necessary to force a nail a given depth; and 3d, the force required to extract the nail when so driven. The obtaining this useful knowledge was reserved for Mr B. Bevan, a gentleman well known in the mechanical and scientific world for the accuracy with which his experiments are conducted.

Mr Bevan observes, that the theoretical investigation points out an equality of resistance to the entrance and extraction of a nail, supposing the thickness to be invariable; but as the general shape of nails is tapering towards the points, the resistance of entrance necessarily becomes greater than that of extraction; in some experiments he found the ratio to be about 6 to 5.

The following Table exhibits the relative adhesion of nails of various kinds, when forced into dry Christiana Deal, at right angles to the grain of the wood.

Description of Nails used.	Number to the lb. Avoir.	Inches long.	Inches forced into the Wood.	Pounds requisite to extract.
Fine Sprigs,	4560	0.44	0.40	22
Ditto,	3200	0.53	0.44	37
Threepenny Brads,	618	1.25	0.50	58
Cast Iron Nails,	380	1.00	0.50	72
Sixpenny Nails,	73	2.50	1.00	187
Ditto,	—	—	1.50	327
Ditto,	—	—	2.00	530
Fivepenny Nails,	139	2.00	1.50	320

The percussive force required to drive the common sixpenny nail to the depth of one inch and a half into dry Christiana deal, with a cast iron weight of 6·275 lbs. was four blows or strokes falling freely the space of 12 inches; and the steady pressure to produce the same effect was 400 lbs.

A sixpenny nail driven into dry elm, to the depth of one inch across the grain, required a pressure of 327 pounds to extract it; and the same nail, driven endways, or longitudinally into the same wood, was extracted with a force of 257 pounds.

The same nail driven two inches endways into dry Christiana deal, was drawn by a force of 257 pounds; and to draw out one inch, under like circumstances, took 87 pounds only. The relative adhesion, therefore, in the same wood, when driven transversely and longitudinally, is 100 to 78, or about 4 to 3 in dry elm; and 100 to 46, or about 2 to 1 in deal; and in like circumstances, the relative adhesion to elm and deal is as 2 or 3 to 1.

The progressive depths of a sixpenny nail into dry Christiana deal by simple pressure were as follows:

One quarter of an inch, a pressure of 24 lbs.
Half an inch . . . . . 26 —
One inch . . . . . 235 —
One inch and a half . . . . 400 —
Two inches . . . . . 610 —

In the above experiments, great care was taked by Mr Bevan to apply the weight steadily, and towards the conclusion of each experiment, the additions did not exceed 10 lbs. at one time, with a moderate interval between, generally about one minute, sometimes 10 or 20 minutes. In other species of wood, the requisite force to extract the nail was different. Thus, to extract a common sixpenny nail from a depth of one inch out of

Dry Oak, required . . . . 507 lbs.
Dry Beech . . . . . 667 —
Green Sycamore . . . . 312 —

From these experiments, we may infer that a common sixpenny nail, driven two inches into dry oak, would require a force of more than half a ton to extract it by a steady force.

ADHESION OF SCREWS.

A common screw, of one-fifth of an inch, was found to have an adhesive force of about three times that of a sixpenny nail.

ADHESION OF IRON PINS.

The force necessary to break or tear out a half-inch iron pin, applied in the manner of a pin to a tenon in the mortice has likewise obtained the attention of the same celebrated experimentalist. The thickness of the board was 0·87 inch, and the distance of the centre of the hole from the end of the board 1·05 inch. The force required was 976 pounds.

As the strength of a tenon from the pin hole may be considered in proportion to the distance from the end, and also as the thickness, we may, for this species of wood, obtain the breaking force in pounds nearly, by multiplying together one thousand times the distance of the hole from the end by the thickness of the tenon in inches.

ADHESION OF GLUE.

Mr Bevan glued together by the ends two cylinders of dry ash-wood, one-fifth of an inch diameter and about eight inches long; after they had been glued together 24 hours, they required a force of 1260 pounds to separate them; and as the area of the circular ends of the cylinders were 1·76 inches, it follows that the force of 715 pounds would be required to separate one square inch.

It is right to observe, that the glue used in this experiment was newly made, and the season very dry. For in some former experiments on this substance, made in the winter season, and upon some glue which had been frequently made, with occasional additions of glue and water, he obtained a result of 350 to 560 pounds to the square inch.

The present experiment, however, was conducted upon a larger scale, and with greater care in the direction of the resultant force, so that it might be, as near as practicable, in a line passing at right angles through the centres of the surfaces in contact. The pressure was applied gradually, and was sustained two or three minutes before the separation took place.

Upon examining the separated surfaces, the glue appeared to be very thin, and did not entirely cover the wood, so that the actual adhesion of glue must be something greater than 715 pounds to the square inch.

Mr Bevan also tried the lateral cohesion of fire-wood, from a Scotch fir of his own planting, cut down in the autumn, sawn into boards, and, at the time of experiment, quite dry and seasoned. The force required to separate the wood was 562 pounds to the square inch; consequently, if two pieces of this wood had been well glued together, the wood would have yielded in its substance before the glue.

From a subsequent experiment, made on solid glue, the cohesive force was found to be 4000 pounds per square inch, from which it may be inferred, that the application of this substance as a cement is susceptible of improvement.

Strength of Metals when pulled in the Direction of their Length.

NAMES OF METALS.	Specific Gravity.	Force necessary to tear asunder one sq. inch in lbs. Avd.	NAMES OF METALS.	Specific Gravity.	Force necessary to tear asunder one sq. inch in lbs. Avd.
Antimony, cast, .	4·500	1.060	Iron, German, mrk'd L.		85·900
Bismuth, cast, .	9·810	3·250	Leige .		62·369
cast, .	9·926	3·008	ditto .		82·839
Copper, cast, Barbary,	8·182	22·570	Oosement .		68·728
Japan,	8·726	20·272	ditto .		76·697
wire .	.	61·228	Spanish .		81·901
Gold, cast, .	9·238	20·450	Swedish .		68·728
wire, . .	·	30·888	ditto . .		88·972
Iron, cast, .			cable .		54·513
gray of Cruzot, 1 fus.	·	30·162	cable . .		73·024
2 fusion	·	30·680	wire .		85·792
English, .	·	52·000	wire . .		113.077
soft	·	40·824	Lead, cast, .	11.479	0·885
French .	·	70·367	wire . .	.	2·547
French .	·	50·981	wire .	11·282	2·581
French .	·	42·666	wire . .	11·348	3·146
French, soft,	·	63·622	milled .	11·407	3·328
gray	·	87·680	Platinum, wire, .	.	52·987
German .	7·807	68·295	wire .	20·847	56·473
Iron, wrought,			Silver, cast, .	11·091	40·902
bar, coarse grained	·	28·460	wire .	.	38·257
medium fineness	·	34·081	Steel, soft, . .	7·780	120·000
fine grained		49·982		to	
of good quality		55·000	razor tempered	7·840	150·000
bar .		61·041	Tin, cast, Banca,	7·217	3·679
do., of best quality		66·000	Eng. block,	7·295	5·322
bar .		80·000	ditto	.	6·650
bar . .		80·333	Malacca .	6·120	3·211
bar .		84·443	wire .	.	7·129
German, mrk'd B.R.		61·361	Zinc, cast, Goslar, .	7·215	2·939
ditto		93·069	ditto	7·215	2·687
common		69·133	patent sheet .	·	16·616
marked L.		69·538	wire .	·	22·551

from 7·600 to 7·800

from 7·600 to 7·800

Strength of Alloys when pulled in the Direction of their Length.

	Parts.	Parts.				Parts.	Parts.		
Brass	.	.	.	45·882	Gold	5,	Copper 1	·	59·000
Copper	10,	Tin 1	.	32·093		2,	Silver 1	·	28·000
	8	1	.	36·088	Lead, Scotch,	10,			
	6	1	.	44·071			Bismuth 1	10·827	2·826
	4	1	.	35·739		2	1	11·090	5·840
	2	1	.	1·017		1	1	10·931	7·319
	1	1	.	0·725	Silver	5,	Copper 1		48·500

Strength of Alloys, &c. — Continued.

NAMES OF METALS.	Specific Gravity.	Force necessary to tear asunder 1 sq. inch in lbs. Avd.	NAMES OF METALS.	Specific Gravity.	Force necessary to tear asunder 1 sq. inch in lbs. Avd.
Parts. Parts.			Parts. Parts.		
Silver 4, Tin 1, .	.	41·000	Tin, Banca, 1, Zinc, Indian, 2	7·100	16·023
Tin, Banca, 10, Antimony 1	7·359	11·181	1 10	7·130	5·671
8 1	7·276	9·881	4, Antimony 1	·	11·323
6 1	7·228	12·632	3 2	·	3·184
4 1	7·192	13·480	1 1	7·000	1·450
2 1	7·105	12·029	Tin, Eng. 10, Lead, 1	·	6·904
1 1	7·060	3·184	8 1	·	7·922
10, Bismuth 1	7·576	12·688	6 1	·	7·997
4 1	7·613	16·692	4 1	·	10·607
2 1	8·076	14·017	2 1	·	7·470
1 1	8·146	12·020	1 1	·	7·074
1 2	8·580	10·013	8, Zinc, Goslar, 1	·	10·607
1 4	9·009	7·875	4 1	·	10·258
1 10	9·439	3·871	2 1	·	10·964
10, Zinc, Indian, 1	7·288	12·914	1 1	·	9·024
2 . 1	7·000	15·025			
1 1	7·321	15·844			

Strength of Woods when pulled in the Direction of their Length.

NAMES OF WOODS.	Specific Gravity.	Force necessary to tear asunder 1 sq. inch in lbs. Avd.	NAMES OF WOOD.	Specific Gravity.	Force necessary to tear asunder 1 sq. inch in lbs. Avd.
Acacia .	0·860	16·000	Cedar . .	0·540	11·400
Alder . .	.	14·186	Cedar . .	.	4·973
Arbutus .	.	7·667	Chesnut, horse .	0·610	12·100
Arbutus . .	.	17·370	sweet .	0·610	10·500
Ash .	0·840	16·700	do. 100 ys. in use	0·877	12·168
Ash . .	0·780	19·600	Citron . .	.	8·176
Ash .	.	17·000	Citron . .	.	12·782
Ash . .	.	12·000	Cypress . .	.	5·105
Ash, red, seasoned	0·812	17·892	Cypress . .	.	6·995
white, seasoned	0·685	14·220	Damson . .	0·790	14·000
Bay . .	.	14·572	Deal, Norway spruce	0·340	18·100
Bay . .	.	10·220	ditto . .	·	17·600
Beech . .	0·720	22·200	Christiana	0·460	12·400
Beech . ·	.	17·709	ditto . .	0·460	12·300
Birch . .	0·640	15·000	ditto .	0·460	14·000
Box . . .	0·990	15·500	English .	0·470	7·000
Cane . .	0.400	6·300	Scotch .	0·498	4·290

Strength of Woods, &c. — Continued.

NAMES OF WOODS.	Specific Gravity.	Force necessary to tear asunder 1 sq. inch in lbs. Avd.	NAMES OF WOOD.	Specific Gravity.	Force necessary to tear asunder 1 sq. inch in lbs. Avd.
Deal, Scotch, yellow	0·472	8·478	Oak, English	0·760	15·000
Elder		10·230	ditto,	0·700	19·800
Elm		13·489	pile out of river Cam	0·610	4·500
Fir, American	0·416	8·874	black Linc. log	0·670	7·700
Riga		9·072	dry, cut four years		16·079
Russian	0·459	10·008	French, unseasoned		9·043
ditto,		10·000	ditto,	1·068	9·985
ditto,		9·792	seasoned		13·659
Memel, seasoned		10·876	Hamburgh	0·660	16·300
weakest		8·280	ditto,	0·660	14·000
strong red		11·040	Provence, seasoned	0·771	12·839
strongest		12·420	seasoned	0·828	13·602
ditto,		13·000	seasoned	1·164	14·685
Hawthorn	0·910	10·700	Pine, pitch		7·818
Hawthorn		9·200	pitch		12·096
Holly	0·760	16·000	pitch		13·176
Jubube		18·915	Norway	0·590	12·400
Jasmine		12·020	Norway	0·660	14·300
Jasmine		11·756	St Petersburg	0·550	13·100
Laburnum	0·920	10·500	St Petersburg	0·490	13·300
Lance wood	1·010	23·400	Plum tree		11·354
Lance wood	1·022	24·696	Plum tree		12·782
Larch	0·636	11·093	Pomegranate		8·308
Scotch, seasoned	0·496	7·888	Pomegranate		11·501
ver dry	0·470	7.020	Poplar	0·360	7·200
Lemon		9·457	Poplar		6·641
Lignum Vitæ	1·220	11·800	Poplar		4·596
Lime tree	0·760	23·500	Quince		5·878
Locust tree		20·582	Quince		8·822
Mahogany	0·870	21·800	Sallow	0·700	18·600
Mahogany	0·800	16·500	Sycamore	0·690	13·000
Spanish	0·753	12·186	Tamarisk		6·895
Maple, Norway	0·793	10·584	Tamarisk		11·247
Mulberry	0·660	17·400	Teak, old	0·530	8·200
Mulberry	0·660	10·600	Java, seasoned	0·697	14·220
Mulberry		14·054	Malabar seasoned	0·688	13·140
Oak, American white		11·501	Pegu	0·619	13·194
Baltic, seasoned	0·673	11·412	Walnut	0·590	7·800
Dantzic		7·704	Willow	0·590	14·000
English		8·820	Willow		12·782
ditto,		10·224	Willow, dry		7·628
ditto, old	0·760	14·000	Yew	0·790	8·000

Strength of Miscellaneous Substances when pulled in the Direction of their Length.

NAMES OF SUBSTANCES.	Specific Gravity.	Force necessary to tear asunder 1 sq. inch in lbs. Avd.	NAMES OF SUBSTANCES.	Specific Gravity.	Force necessary to tear asunder 1 sq. inch in lbs. Avd.
Brick		0·300	Paper, strips glued tog'r		30·000
Brick . . .		0·280	Plaster of Paris .		0·072
Bone of an Ox .		5.265	Slate, Welsh .		12·800
Glass, plate . .	2·453	9.420	Stone, Givry, hard	2·357	2·166
Hemp, fibres glued tog'r		92·000	soft	2·071	0·385
Horn of an Ox .		8·949	hemogeneous, white		
Ivory . . .		16·626	of a fine grain		0·207
Marble, white .		9·000	Whalebone . .		7·667
Mortar, 16 years old		0·050			

STRENGTH OF MATERIALS WHEN EXPOSED TO TRANSVERSE OR CROSS STRAINS.

1. — *To find the Breadth of a uniform Cast Iron Beam, to bear a given weight in the middle.*

RULE. — Multiply the length between the supports in feet, by the weight to be supported in pounds, and divide the product by 850 times the square of the depth in inches; the quotient will be the required breadth in inches.

2. — *To find the Depth of a uniform Cast Iron Beam, to bear a given weight in the middle.*

RULE 1. — Multiply the length of bearing in feet, by the weight to be supported in pounds, and divide this product by 850 times the breadth in inches; and the square root of the quotient will be the required depth in inches.

When no particular breadth or depth is determined by the nature of the situation for which the beam is intended, it will be found sometimes convenient to assign some proportion; as, for example, let the breadth be the *n*th part of the depth, *n* representing any number at will. Then the rule will be as follows: —

RULE 2. — Multiply *n* times the length in feet, by the weight in pounds; divide this product by 850, and the cube root of the quotient will be the depth required; the breadth will be the *n*th part of the depth.

NOTE. — It may be remarked here, that the rules are the same for inclined as for horizontal beams, when the horizontal distance between the supports is taken for the length of bearing.

EXAMPLE. — In a situation where the flexure of a beam is not a material defect, it is required to support a load which cannot exceed 33600 pounds, or

15 tons, in the middle of a cast iron beam, the distance of the supports being 20 feet; and making the breadth a fourth part of the depth. In this case.

$$n = 4 \text{ and } \frac{4 \times 20 \times 33600}{850} = 3162{\cdot}35.$$

The cube root of 3162·35 is nearly 14·68 inches, the depth required; the breadth is

$$14{\cdot}68 \div 4 = 3{\cdot}87 \text{ inches.}$$

In practice, therefore, whole numbers should be used, and the beam be made 15 inches in depth, and 4 inches in breadth.

3. — *To find the Breadth of a uniform Cast-Iron Beam, when the load is not in the middle between the supports.*

Rule. — Multiply the distance between the load and the nearest support in feet, by the distance between the load and the furthest support in feet, and four times this product, divided by the whole length between the supports, will give the effective leverage of the load in feet; this quotient being used instead of the length, in any of the foregoing Rules, will give the breadth and depth.

Example. — Instead of placing 15 tons in the middle of a beam, as in the last Example, let it be placed at 5 feet from one end, and 15 feer from the other.

$$\frac{5 \times 15 \times 4}{20} = 15,$$

which is the number to be employed instead of the whole length, as in the last example; that is

$$\frac{4 \times 15 \times 33600}{850} = 2372 \text{ nearly.}$$

And the cube root of 2372 is nearly 13·34 inches, the depth of the required beam; and

$$13{\cdot}34 \div 4 = 3{\cdot}333 \text{ inches}$$

gives the breadth; or the beam is nearly 13½ inches by 3½ inches. In the foregoing Example it was 15 inches by 4 inches.

4. — *To substitute Beams of Wrought Iron, of Oak, or of Yellow Fir instead of having Beams of Cast Iron, in either of the foregoing problems.*

Rule. — Instead of using 850 as a divisor, when the beam is of wrought iron, employ 952; when it is of oak, 212; and when it is of yellow fir 255.

5. — *To find the Breadth of a uniform Cast-Iron Beam, when the load is distributed over the length of a Beam supported at both ends.*

Rule. — When the load is uniformly distributed over the length of a beam, it supports double the weight that it would do if the load were laid on the middle; therefore the divisor, in the preceding examples, is changed from 850 to 1700.

EXAMPLE. — In a situation where an arch cannot be used for want of abutments, it is necessary to leave an opening 15 feet wide, in an 18 inch brick-wall; required the depth of two cast-iron beams to support the walls over the openings, each beam to be 2 inches thick, and the height of the wall intended to rest on the beam being 30 feet?

The wall contains

$$30 \times 15 \times 1\tfrac{1}{2} = 675 \text{ cubic feet};$$

and as a cubic foot of brickwork weighs about 100 lbs. the weight of the wall will be about 67500 lbs.; and half this weight, or 33750 lbs., will be the load upon one of the beams. Since the breadth is supposed to be given, the depth will be found by problem 2, if 1700 be used as the constant divisor; thus,

$$\frac{15 \times 33750}{1700 \times 2} = 149 \text{ nearly.}$$

The square root of 149 is $12\frac{1}{4}$ nearly; therefore each beam should be $12\frac{1}{4}$ inches deep, and 2 inches in thickness. This operation gives the actual strength necessary to support the wall; but double the weight is usually taken in practice to allow for accidents. In this manner the strength for brestsummers, lintels, and the like, may be determined.

6. — *To find the Dimensions of a Cast or Wrought Iron Beam, when it is to be fixed at one end and loaded at the other; or when it is to be supported at the middle, and loaded at both ends.*

RULE. — When the beam is fixed at one end, take the length of the projection of the beam, for the length, and apply the rules in problem 1 and 2, using the 212 instead of 850 as a divisor. By the same rule, the proportions for the arms of a balance may be found.

When the beam is of wrought iron, employ 238 as a divisor.

EXAMPLE. — Let the length of the arms, from the centre of suspension to the centre of motion, be $1\frac{1}{2}$ feet, and the extreme weight 3 cwt. or 336 pounds, and let the thickness be one-tenth part of the depth: then by the rule

$$\frac{10 \times 1{\cdot}5 \times 336}{212} = 24 \text{ nearly.}$$

The cube root of 24 is 2·88 inches, which will be the depth of the beam at the centre; and the breadth will be 0·288 inch.

When the weight is uniformly distributed over the length of the beam, employ 425 instead of 850, as a divisor.

7. — *To find the Dimensions of the Teeth of Wheels.*

RULE. — Divide the stress at the pitch-circle in pounds by 1500, and the square root of the product is the thickness of the teeth in inches.

EXAMPLE. — Let the greatest power acting at the pitch-circle of a wheel be 6000 pounds; then

$$6000 \div 1500 = 4,$$

and the square root of 4 is 2 inches, the thickness required.

The breadth of teeth should be proportional to the stress upon them, and this stress should not exceed 400 pounds for each inch in breadth.

The length of teeth ought not to exceed the thickness, but the strength is not affected by the less or greater length of the teeth.

8. — *To find the Diameter of a Solid Cylinder to support a given weight in the middle.*

RULE. — Multiply the weight in pounds by the length in feet; divide this product by 500, and the cube root of the quotient will be the diameter in inches.

9. — *To find the Diameter of a Solid Cylinder to support a weight between the middle and the end.*

RULE. — Multiply the short end by the long end; then multiply that product by four times the weight in pounds. Divide this product by 500 times the length in feet, and the cube root of the quotient will be the diameter in inches.

10. — *To find the Diameter of a Solid Cylinder when the load is uniformly distributed over the length.*

RULE. — Multiply the length in feet by the weight in pounds, and one-tenth of the cube root of the product will be the diameter in inches.

11. — *To find the Diameter of a Solid Cylinder when fixed at one end, and having the load applied at the other.*

RULE. — Multiply the length of projection in feet by the weight in pounds, and the 5th part of the cube root of this product will be the diameter in inches.

STRENGTH OF MATERIALS WHEN EXPOSED TO A LATERAL STRAIN.

The rules given in problems 8, 9, 10, and 11, can be applied.

EXEMPLE. — What is the diameter of the journal of a water-wheel shaft, 13 feet long, the weight of the wheel being 15 tons or 33600 lbs.

When the weight is in the middle $\frac{33600 \times 13}{500} = 873$, and the cube root of 873 is $9\frac{1}{2}$ inches, the diameter of the required journal.

When the weight is equally distributed, $33600 \times 13 = 436800$, and the cube root of 436800 divided by 10 will give 7·65 inches the diameter required.

TABLE VIII.

OF SQUARES AND CUBES.

To facilitate the Mensuration of the Surfaces and Solidities of Bodies.

Number.	Square.	Cube.	Number.	Square.	Cube.
1	1	1	44	1936	85184
2	4	8	45	2025	91125
3	9	27	46	2116	97336
4	16	64	47	2209	103823
5	25	125	48	2304	110592
6	36	216	49	2401	117649
7	49	343	50	2500	125000
8	64	512	51	2601	132651
9	81	729	52	2704	140608
10	100	1000	53	2809	148877
11	121	1331	54	2916	157464
12	144	1728	55	3025	166375
13	169	2197	56	3136	175616
14	196	2744	57	3249	185193
15	225	3375	58	3364	195112
16	256	4096	59	3481	205379
17	289	4913	60	3600	216000
18	324	5832	61	3721	226981
19	361	6859	62	3844	238328
20	400	8000	63	3969	250047
21	441	9261	64	4096	262144
22	484	10648	65	4225	274625
23	529	12167	66	4356	287496
24	576	13824	67	4489	300763
25	625	15625	68	4624	314432
26	676	17576	69	4761	328509
27	729	19683	70	4900	343000
28	784	21952	71	5041	357911
29	841	24389	72	4184	373248
30	900	27000	73	5329	389017
31	961	29791	74	5476	405224
32	1024	32768	75	5625	421875
33	1089	35937	76	5776	438976
34	1156	39304	77	5929	456533
35	1225	42875	78	6084	474552
36	1296	46656	79	6241	493039
37	1369	50653	80	6400	512000
38	1444	54872	81	6561	531441
39	1521	59319	82	6724	551368
40	1600	64000	83	6889	571787
41	1681	68921	84	7056	592704
42	1764	74088	85	7225	614125
43	1849	79507	86	7396	636056

Number.	Square.	Cube.	Number.	Square.	Cube.
87	7569	658503	136	18496	2515456
88	7744	681472	137	18769	2571353
89	7921	704969	138	19044	2628072
90	8100	729000	139	19321	2685619
91	8281	753571	140	19600	2744000
92	8464	778688	141	19881	2803221
93	8049	804357	142	20164	2863288
94	8836	830584	143	20449	2924207
95	9025	857375	144	20736	2985984
96	9216	884736	145	21025	3048625
97	9409	912673	146	21316	3112136
98	9604	941192	147	21609	3176523
99	9801	970299	148	21904	3241792
100	10000	1000000	149	22201	3307949
101	10201	1030301	150	22500	3375000
102	10404	1061208	151	22801	3442951
103	10609	1012727	152	23104	3511808
104	10816	1124864	153	23409	3581577
105	11025	1157625	154	23716	3652264
106	11236	1191016	155	24025	3723875
107	11449	1225043	156	24336	3796416
108	11664	1259712	157	24649	3869893
109	11881	1295029	158	24964	3944312
110	12100	1331000	159	25281	4019679
111	12321	1367631	160	25600	4096000
112	12544	1404928	161	25921	4173281
113	12769	1442897	162	26244	4251528
114	12996	1481544	163	26569	4330747
115	13225	1520875	164	26896	4410944
116	13456	1560896	165	27225	4492125
117	13689	1601613	166	27556	4574296
118	13924	1643032	167	27889	4657463
119	14161	1685159	168	28224	4741632
120	14400	1728000	169	28561	4826809
121	14641	1771561	170	28900	4913000
122	14884	1815848	171	29241	5000211
123	15129	1860867	172	29584	5088448
124	15376	1906624	173	29929	5177717
125	15625	1953125	174	30276	5268024
126	15876	2000376	175	30625	5359375
127	16129	2048383	176	30976	5451776
128	16384	2097152	177	31329	5545233
129	16641	2146689	178	31684	5639752
130	16900	2197000	179	32041	5735399
131	17161	2248091	180	32400	5832000
132	17424	2299968	181	32761	5929741
133	17689	2352637	182	33124	6028568
134	17956	2406104	183	33489	6128487
135	18225	2460375	184	33856	6229504

Number.	Square.	Cube.	Number.	Square.	Cube.
185	34225	6331625	234	54756	12812904
186	34596	6434856	235	55225	12977875
187	34969	6539203	236	55696	13144256
188	35344	6644672	237	56169	13312053
189	35721	6751269	238	56644	13481272
190	36100	6859000	239	57121	13651919
191	36481	6967871	240	57600	13824000
192	36864	7077888	241	58081	13997521
193	37249	7189057	242	58564	14172488
194	37636	7301384	243	59049	14348907
195	28025	7414875	244	59536	14526784
196	38416	7529536	245	60025	14706125
197	38809	7645373	246	60516	14886936
198	39204	7762392	247	61009	15069223
199	39601	7880599	248	61504	15252992
200	40000	8000000	249	62001	15438249
201	40401	8120601	250	62500	15625000
202	40804	8242408	251	63001	15813251
203	41209	8365427	252	63504	16003008
204	41616	8489664	253	64009	16194277
205	42025	8615125	254	64516	16387064
206	42436	8741816	255	65025	16581375
207	42849	8869743	256	65536	16777216
208	43264	8998912	257	66049	16974593
209	43681	9123329	258	66564	17173512
210	44100	9261000	259	67081	17373979
211	44521	9393931	260	67600	17576000
212	44944	9528128	261	68121	17779581
213	45369	9663597	262	68644	17984728
214	45796	9800344	263	69169	18191447
215	46225	9938375	264	69696	18399744
216	46656	10077696	265	70225	18609625
217	47089	10218313	266	70756	18821096
218	47524	10360232	267	71289	19034163
219	47961	10503459	268	71824	19248832
220	48400	10648000	269	72361	19463509
221	48841	10793861	270	72900	19683000
222	49284	10941048	271	73441	19902511
223	49729	11089567	272	73984	20123648
224	50176	11239424	273	74529	20346417
225	50625	11390625	274	75076	20520824
226	51076	11543176	275	75625	20796875
227	51529	11697083	276	76176	21024576
228	51984	11852352	277	76729	21253933
229	52441	12008989	278	77284	21484952
230	52900	12167000	279	77841	21717639
231	53361	12326391	280	78400	21952000
232	53824	12487168	281	78961	22188041
233	54289	12649337	282	79524	22425768

Number.	Square.	Cube.	Number.	Square.	Cube.
283	80089	22665187	332	110224	36594368
284	80656	22906304	333	110889	36926037
285	81225	23149125	334	111556	37259704
286	81796	23393656	335	112225	37595375
287	82369	23639903	336	112896	37933056
288	82944	23887872	337	113569	38272753
289	83521	24137569	338	114244	38614472
290	84100	24389000	339	114921	38958219
291	84681	24642171	340	115600	39304000
292	85264	24897088	341	116281	39651821
293	85849	25153757	342	116964	40001688
294	86436	25412184	343	117649	40353607
295	87025	25672375	344	118336	40707584
296	87616	25934336	345	119025	41063625
297	88209	26198073	346	119716	41421736
298	88804	26463592	347	120409	41781923
299	89401	26730899	348	121104	42144192
300	90000	27000000	349	121801	42508549
301	90601	27270901	350	122500	42875000
302	91204	27543608	351	123201	43243551
303	91809	27818127	352	123904	43614208
304	92416	28094464	353	124609	43986977
305	93025	28372625	354	125316	44361864
306	93636	28652616	355	126025	44738875
307	64249	28934443	356	126736	45118016
308	94864	29218112	357	127449	45499293
309	95481	29503629	358	128164	45882712
310	96100	29791000	359	128881	46268279
311	96721	30080231	360	129600	46656000
312	97344	30371328	361	130321	47045881
313	97969	30664297	362	131044	47437928
314	98596	30959144	363	131769	47832147
315	99225	31255875	364	132496	48228544
316	99856	31554496	365	133225	48627125
317	100489	31855013	366	133956	49027896
318	101124	32157432	367	134689	49430863
319	101761	32461759	368	135424	49836032
320	102400	32768000	369	136161	50243409
321	103041	33076161	370	136900	50653000
322	103684	33386248	371	137641	51064811
323	104329	33698267	372	138384	51478848
324	104976	34012224	373	139129	51895117
325	105625	34328125	374	139876	52313624
326	106276	34645976	375	140625	52734375
327	106929	34965783	376	141376	53157376
328	107584	35287552	377	142129	53582633
329	108241	35611289	378	142884	54010152
330	108900	35937000	379	143641	54439939
331	109561	36266691	380	144400	54872000

Number.	Square.	Cube.	Number.	Square.	Cube.
381	145161	55306341	430	184900	79507000
382	145924	55742968	431	185761	80062991
383	146689	56181887	432	186624	80621568
384	147456	56623104	433	187489	81182737
385	148225	57066625	434	188356	81746504
386	148996	57512456	435	189225	82312875
387	149769	57960603	436	190096	82881856
388	150544	58411072	437	190969	83453453
389	151321	58863869	438	191844	84027672
390	152100	59319000	439	192721	84604519
391	152881	59776471	440	193600	85184000
392	153664	60236288	441	194481	85766121
393	154449	60698457	442	195364	86350888
394	155236	61162984	443	196249	86938307
395	156025	61629875	444	197136	87528384
396	156816	62099136	445	198025	88121125
397	157609	62570773	446	198916	88716536
398	158404	63044792	447	199809	89314623
399	159201	63521199	448	200704	89915392
400	160000	64000000	449	201601	90518849
401	160801	64481201	450	202500	91125000
402	161604	64964808	451	203401	91733851
403	162409	65450827	452	204304	92345408
404	163216	65939264	453	205209	92959677
405	164025	66430125	454	206116	93576664
406	164836	66923416	455	207025	94196375
407	165649	67419143	456	207936	94818816
408	166464	67917312	457	208849	95443993
409	167281	68417929	458	209764	96071912
410	168100	68921000	459	210681	96702579
411	168921	69426531	460	211600	97336000
412	169744	69934528	461	212521	97972181
413	170569	70444997	462	213444	98611128
414	171396	70951944	463	214369	99252847
415	172225	71473375	464	215296	99897344
416	173056	71991296	465	216225	100544625
417	173889	72511713	466	217156	101194696
418	174724	73034632	467	2180-9	101847563
419	175561	73560059	468	219024	102503232
420	176400	74088000	469	219961	103161709
421	177241	74618461	470	220900	103823000
422	178084	75151448	471	221841	104487111
423	178929	75686967	472	222784	105154048
424	179776	76225024	473	223729	105823817
425	180625	76765625	474	224676	106496424
426	181476	77308776	475	225625	107171875
427	182329	77854483	476	226576	107850176
428	183184	78402752	477	227529	108531333
429	184041	78953589	478	228484	109215352

Number.	Square.	Cube.	Number.	Square.	Cube.
479	229441	109902239	528	278784	147197952
480	230400	110592000	529	279841	148035889
481	231361	111284641	530	280900	148877000
482	232324	111980168	531	281961	149721291
483	233289	112678587	532	283024	150568768
484	234256	113379904	533	284089	151419437
485	235225	114084125	534	285156	152273304
486	236196	114791256	535	286225	153130375
487	237169	115501303	536	287296	153990656
488	238144	116214272	537	288369	154854153
489	239121	116930169	538	289444	155720872
490	240100	117649000	539	290521	156590819
491	241081	118370771	540	291600	157464000
492	242064	119095488	541	292681	158340421
493	243049	119823157	542	293764	159220088
494	244036	120553784	543	294849	160103007
495	245025	121287375	544	295936	161878625
496	246016	122023936	545	297025	162771336
497	247009	122763473	546	298116	162771336
498	248004	123505992	547	299209	163667323
499	249001	124251499	548	300304	164566592
500	250000	125000000	549	301401	165469149
501	251001	125751501	550	302500	166375000
502	252004	126506008	551	303601	167284151
503	253009	127263527	552	304704	169112377
504	254016	128024064	553	305809	169112377
505	255025	128787625	554	306916	170031464
506	256036	129554216	555	308025	170953875
507	257049	130223843	556	309136	171879616
508	258064	131096512	557	310249	172808693
509	259081	131872229	558	311364	173741112
510	259081	132651000	559	312481	174676879
511	261121	133432831	560	313600	175616000
512	262144	134217728	561	314721	176558481
513	263169	135005697	562	315844	177504328
514	264196	135796744	563	316969	178453547
515	265225	136590875	564	318096	179406144
516	266256	137388096	565	319225	180362125
517	267289	138188413	566	320356	181321496
518	268324	138991832	567	321489	182284263
519	269361	139798359	568	322624	183250432
520	270400	140608000	569	323761	184220009
521	271441	141420761	570	324900	185193000
522	272484	142236648	571	326041	186169411
523	273529	143055667	572	327184	187149248
524	274576	143877824	573	328329	188132517
525	275625	144703125	574	329476	189119224
526	276676	145531576	575	330625	190109375
527	277729	146363183	576	331776	191102976

Number.	Square.	Cube.	Number.	Square.	Cube.
577	332929	192100033	626	391876	245314376
578	334084	1931 0552	627	393129	246491883
579	335241	194104539	628	394384	247673152
580	336400	195112000	629	395641	248858189
581	337561	196122941	630	396900	250047000
582	338724	197137368	631	398161	251239591
583	339889	198155287	632	399424	252435968
584	341056	199176704	633	400689	253636137
585	342223	200201625	634	401956	254840104
586	343396	201230056	635	403225	256047875
587	344569	202262003	636	404496	257259456
588	345744	203297472	637	405769	258474853
589	346921	204336469	638	407044	259694072
590	348100	205379000	639	408321	260917119
591	349281	206425071	640	409600	262144000
592	350464	207474688	641	410881	263374721
593	351649	208527857	642	412164	264609288
594	352836	209584584	643	413449	265847707
595	354025	210644875	644	414736	267089984
596	355216	211708736	645	416025	268336125
597	356409	212776173	646	417316	269586136
598	357604	213847192	647	418609	270840023
599	358801	214921799	648	419904	272097792
600	360000	216000000	649	421201	273359449
601	361201	217081801	650	422500	274625000
602	362404	218167208	651	423801	275894451
603	363609	219256227	652	425104	277167808
604	364816	220348864	653	426409	278445077
605	366025	221445125	654	427716	279726264
606	367236	222545016	655	429025	281011375
607	368449	223648543	656	430336	282300416
608	369664	224755712	657	431649	283593393
609	370881	225866529	658	432964	284890312
610	372100	226981000	659	434281	286191179
611	373321	228099131	660	435600	287496000
612	374544	229220928	661	436921	288804781
613	375769	230346397	662	438244	290117528
614	376996	231475544	663	439569	291434247
615	378225	232608375	664	440896	292754944
616	379456	233744896	665	442225	294079625
617	380689	234885113	666	443556	295408296
618	381924	236029032	667	444889	296740963
619	383161	237176659	668	446224	298077632
620	384400	238328000	669	447561	299418309
621	385641	239483061	670	448900	300763000
622	386884	240641848	671	450241	302111711
623	388129	241804367	672	451584	303464448
624	389376	242970624	673	452929	304821217
625	390625	244140625	674	454276	306182024

Number.	Square.	Cube.	Number.	Square.	Cube.
675	455625	307546875	724	524176	379503424
676	456976	308915776	725	525625	381078125
677	458329	310288733	726	527076	382657176
678	459684	311665752	727	528529	384240583
679	461041	313046839	728	529984	385828352
680	462400	314432000	729	531441	387420489
681	463761	315821241	730	532900	389017000
682	465124	317214568	731	534361	390617891
683	466489	318611987	732	535824	392223168
684	467856	320013504	733	537289	393832837
685	469225	321419125	734	538756	395446904
686	470596	322828856	735	540225	397065375
687	471969	324242703	736	541696	398688256
688	473344	325660672	737	543169	400315553
689	474721	327082769	738	544644	401947272
690	476100	328509000	739	546121	403583419
691	477481	329939371	740	547600	405224000
692	478864	331373888	741	549081	406969021
693	480249	332812557	742	550564	408518488
694	481636	334255384	743	552049	410172407
695	483025	335702375	744	553536	411830784
696	484416	337153536	745	555025	413493625
697	485809	338608873	746	556516	415160936
698	487204	340068392	747	558009	416832723
699	488601	341532099	748	559504	418508992
700	490000	343000000	749	561001	420189749
701	491401	344472101	750	562500	421875000
702	492804	345948408	751	564001	423564751
703	494209	347428927	752	565504	425259008
704	495616	348913664	753	567009	426957777
705	497025	350402625	754	568516	428661064
706	498436	351895816	755	570025	430368875
707	499849	353393243	756	571536	432081216
708	501264	354894912	757	573049	433798093
709	502681	356400829	758	574564	435519512
710	504100	357911000	759	576081	437245479
711	505521	359425431	760	577600	438976000
712	506944	360944128	761	579121	440711081
713	508369	362467097	762	580644	442450728
714	509796	363994344	763	582169	444194947
715	511225	365525875	764	583696	445943744
716	512656	367061696	765	585225	447697125
717	514089	368601813	766	586756	449455096
718	515524	370146232	767	588289	451217663
719	516961	371694959	768	589824	452984832
720	518400	373248000	769	591361	454756609
721	519841	374805361	770	592900	456543000
722	521284	376367048	771	594441	458314011
723	522729	377933067	772	595984	460099648

Number.	Square.	Cube.	Number.	Square.	Cube.
773	597529	461889917	822	675684	555412248
774	599076	463684824	823	677329	557441767
775	600625	465484375	824	678976	559476224
776	602176	467288576	825	680625	561515625
777	603729	469097433	826	682276	563559976
778	605284	470910952	827	683929	565609283
779	606841	472729139	828	685584	567663552
780	608400	474552000	829	687241	569722789
781	609961	476379541	830	688900	571787000
782	611524	478211768	831	690561	573856191
783	613089	480048687	832	692224	575930368
784	614656	481890304	833	693889	578009537
785	616225	483736025	834	695556	580093704
786	617796	485587656	835	697225	582182875
787	619369	487443403	836	698896	584277056
788	620944	489303872	837	700569	586376253
789	622521	491169069	838	702244	588480472
790	624100	493039000	839	703921	590589719
791	625681	494913671	840	705600	592704000
792	627264	496793088	841	707281	594823321
793	628849	498677257	842	708964	596947688
794	630436	500566184	843	710649	599077107
795	632025	502459875	844	712336	601211584
796	633616	504358336	845	714025	603351125
797	635209	506261573	846	715717	605495736
798	636804	508169592	847	717409	607645423
799	638401	510082399	848	719104	609800192
800	640000	512000000	849	720801	611960049
801	641601	513922401	850	722500	614125000
802	643204	515849608	851	724201	616295051
803	644809	517781627	852	725904	618479208
804	646416	519718464	853	727609	620650477
805	648025	521660125	854	729316	622835864
806	649636	523606616	855	731025	625026375
807	651249	525557943	856	732736	627222016
808	652864	527514112	857	734449	629422793
809	654481	529475129	858	736164	631628712
810	656100	531441000	859	737881	633839779
811	657721	533411731	860	739600	636056000
812	659344	535387328	861	741321	638277381
813	660969	537367797	862	743044	640503928
814	662596	539353144	863	744769	642735647
815	664225	541313375	864	746496	644972544
816	665856	543338496	865	748225	647214625
817	667489	545338513	866	749956	649461896
818	669124	547343432	867	751689	651714363
819	670761	549353259	868	753424	653972032
820	672400	551368000	869	755161	656234909
821	674041	553387661	870	756900	658503000

Number.	Square.	Cube.	Number.	Square.	Cube.
871	758641	660776311	920	846400	778688000
872	760384	663054848	921	848241	781229961
873	762129	665338617	922	850084	783777448
874	763876	667627624	923	851929	786330467
875	765625	669921875	924	853776	788889024
876	767376	672221376	925	855625	791453125
877	769129	674526133	926	857476	794022776
878	770884	676836152	927	859329	796597983
879	772641	679151439	928	861184	799178752
880	774400	681472000	929	863041	801765089
881	776161	683797841	930	864900	804357000
882	777924	686128968	931	866761	806954491
883	779689	688465387	932	868624	809557568
884	781456	690807104	933	870489	812166237
885	783225	693154125	934	872356	814780504
886	784996	695506456	935	874225	817400375
887	786769	697864103	936	876096	820025856
888	788544	700227072	937	877969	822656953
889	790321	702595369	938	870844	825293672
890	792100	704969000	939	881721	827936019
891	793881	707347971	940	883600	830584000
892	795664	709732288	941	885481	833237621
893	797449	712121957	942	887364	835896888
894	799236	714516984	943	889249	838561807
895	801025	716917375	944	891136	841232384
896	802816	719323136	945	893025	843908625
897	804609	721734273	946	894916	846590536
898	806404	724150792	947	896809	849278123
899	808201	726572699	948	898704	851971392
900	810000	729000000	949	900601	854670349
901	811801	731432701	950	902500	857375000
902	813604	733870808	951	904401	860085351
903	815409	736314327	952	906304	862801408
904	817216	738763264	953	908209	865523177
905	819025	741217625	954	910116	868250664
906	820836	743677416	955	912025	870983875
907	822649	746142643	956	913936	873722816
908	824464	748613312	957	915849	876467493
909	826281	751089429	958	917764	879217912
910	828100	753571000	959	919684	881974079
911	829921	756058031	960	921600	884736000
912	831744	758550528	961	923521	887503681
913	833569	761048497	962	925444	890277128
914	835396	763551944	963	927369	893056347
915	837325	766060875	964	929296	895841344
916	839056	768575296	965	931225	898632125
917	849889	771095213	966	933156	901428696
918	842724	773620632	967	935089	904231063
919	844561	776151559	968	937024	907039232

Number.	Square.	Cube.	Number.	Square.	Cube.
969	938961	909853209	985	970225	955671625
970	940900	912673000	986	972196	958585256
971	942841	915498611	987	974169	961504803
972	944784	918330048	988	976144	964430272
973	946729	921167317	989	978121	967361669
974	948676	924010424	990	980100	970299000
975	950625	926859375	991	982081	973242271
976	952576	929714176	992	984064	976191488
977	954529	932574833	893	986049	979146657
978	956484	935441352	994	988036	982107784
979	958441	938313739	995	990025	985074875
980	960400	941192001	996	992016	988047936
981	962361	944076141	997	994009	991026973
982	964324	946966168	998	996004	994011992
983	966289	949862087	999	998001	997002999
984	968256	952763904	1000	1000000	1000000000

To find the Square of a greater Number than is contained in the Table.

RULE 1. — If the number required to be squared exceed, by 2, 3, 4, or any other number of times, any number contained in the table, let the square affixed to the number in the table be multiplied by the square of 2, 3, or 4, &c., and the product will be the answer sought.

EXAMPLE. — Required the square of 2595.

2595 is three times greater than 865; and the square of 865, as per table, is 748225.

Then, $748225 \times 3^2 = 6734025$, Ans.

RULE 2. — If the number required to be squared be an odd number, and do not exceed twice the amount of any number contained in the table, find the two numbers nearest to each other, which, added together, make that sum; then, the sum of the squares of these two numbers, as per table, multiplied by 2, will exceed the square required by 1.

EXAMPLE. — Required the square of 1865.

Two nearest numbers $\left.\begin{matrix}932\\933\end{matrix}\right\} = 1865.$

Then, per table, $\left.\begin{matrix}932^2 = 868624\\933^2 = 870498\end{matrix}\right\} = 1739113 \times 2 = 3478226 - 1$ $= 3478225$, Ans.

To find the Cube of a greater Number than is contained in the Table.

RULE. — Proceed, as in squares, to find how many times the number required to be cubed exceeds a number contained in the table. Multiply the cube of that number by the cube of as many times as the number sough exceeds the number in the table, and the product will be the answer required.

EXAMPLE. — Required the cube of 3984.

3984 is 4 times greater than 996; and the cube of 996, as per table, is 988047936.

Then, $988047936 \times 4^3 = 63235067904$, Ans.

To find the Squares of Numbers following each other in arithmetical progression.

RULE. — Find, in the usual manner, the squares of the first two numbers, and subtract the less from the greater. Bring down, in a separate column, the square of the largest of these two numbers, and add it to the difference, with the addition of 2 as a constant quantity; the product will be the square of the next ensuing number.

EXAMPLE.—Suppose it be required to extend the foregoing table of squares.

Then, $1000^2 = 1000000$
$999^2 = 998001$

1999 Difference.

1000000 the Square of 1000.
Difference $1999 + 2 =$ 2001

1002001 the Square of 1001.
Difference $2001 + 2 =$ 2003

1004004 the Square of 1002.
Difference $2003 + 2 =$ 2005

1006009 the Square of 1003.
Difference $2005 + 2 =$ 2007

1008016 the Square of 1004.

In a similar manner the squares of any numbers, following each other in arithmetical progression, may be found; or the foregoing table may easily be extended to any required length.

To find the Cubes of Numbers following each other in arithmetical progression.

The cubes of a natural series of numbers may be found by a method very similar to that used for the squares; but as two series of differences have to be added, in the cubes, the operation is somewhat more complex.

RULE. — Find the cubes of the first two numbers, and substract the less from the greater. Then, multiply the least of the two numbers cubed by 6, add the product, with the addition of 6 as a constant quantity, to the difference; and thus continue the first series of differences.

For the second series of differences bring down, in a separate column, the cube of the highest of the above numbers, and add the difference to it. The amount will be the cube of the next general number.

EXAMPLE. — Required the cubes of 1001, 1002, 1003, and 1004.

First series of differences.

Per Table 1000^3 =	1000000000
929^3 =	997002999
	2997001 difference.
$999 + 6 + 6$ =	6000
	3003001 difference of 1000.
$6000 + 6$ =	6006
	3009007 difference of 1001.
$6006 + 6$ =	6012
	3015019 difference of 1002.
$6012 + 6$ =	6018
	3021037 difference of 1003.

Second series of differences.

Then,	1000000000 = Cube of 1000.
Difference for 1000 =	3003001
	1003003001 = Cube of 1001.
Difference for 1001 =	3009007
	1006012008 = Cube of 1002.
Difference for 1002 =	3015019
	1009027027 = Cube of 1003.
Difference for 1003 =	3021037
	1012048064 = Cube of 1004.

TABLE IX.

OF SQUARE AND CUBE ROOTS.

To facilitate the Mensuration of the Surfaces and Solidities of Bodies.

Number.	Square Root.	Cube Root.	Number.	Square Root.	Cube Root.
1	1·0	1·0	44	6·6332496	3·530348
2	1·4142136	1·259921	45	6·7082039	3·556893
3	1·7320508	1·442250	46	6·7823300	3·583048
4	2·0	1·587401	47	6·8556546	3·608826
5	2·2360680	1·709976	48	6·9282032	3·634241
6	2·4494897	1·817121	49	7·0	3·659306
7	2·6457513	1·912933	50	7·0710678	3·684031
8	2·8284271	2·0	51	7.1414284	3·708430
9	3 0	2·080084	52	7·2111026	3·732511
10	3·1622777	2·154435	53	7·2801099	3·756286
11	3·3166248	2·223980	54	7·3484692	3·779763
12	3·4641016	2·289428	55	7·4161985	3·802953
13	3·6055513	2·351335	56	7·4833148	3·825862
14	3·7416574	2·410142	57	7·5498344	3·848501
15	3·8729833	2·466212	58	7·6157731	3·870877
16	4·0	2·519842	59	7·6811457	3·892996
17	4·1231056	2·571282	60	7·7459667	3·914867
18	4·2426407	2·620741	61	7·8102497	3·936497
19	4·3588989	2·668402	62	7·8740079	3·957892
20	4·4721360	2·714418	63	7·9372539	3·979027
21	4·5825757	2·758923	64	8·0	4·0
22	4·6904158	2·802039	65	8·0622577	4·020726
23	4·7958315	2·843867	66	8·1240384	4·041240
24	4·8989795	2·884499	67	8·1853528	4·061548
25	5·0	2·924018	68	8·2462113	4·081656
26	5·0990195	2·962496	69	8·3066239	4·101566
27	5·1961524	3·0	70	8·3666003	4·121285
28	5·2915026	3·036589	71	8·4261498	4·140818
29	5·3851648	3·072317	72	8 4852814	4·160168
30	5·4772256	3·107232	73	8·5440037	4·179339
31	5·5677644	3·141381	74	8·6023253	4·198336
32	5·6568542	3·174802	75	8·6602540	4·217163
33	5·7445626	3·207534	76	8·7177979	4·235824
34	5·8309519	3·239612	77	8·7749644	4·254321
35	5·9160798	3·271066	78	8·8317609	4·272659
36	6·0	3·301927	79	8·8881944	4·290841
37	6·0827625	3·332222	80	8·9442719	4·308870
38	6·1644140	3·361975	81	9·0	4·326749
39	6·2449980	3·391211	82	9·0553851	4·344481
40	6·3245553	3·419952	83	9·1104336	4·362071
41	6·4031242	3·448217	84	9·1651514	4·379519
42	6·4807407	3·476027	85	9·2195445	4·396830
43	6·5574385	3·503398	86	9·2736185	4·414005

Number.	Square Root.	Cube Root.	Number.	Square Root.	Cube Root.
87	9·3273791	4·431047	136	11·6619038	5·142563
88	9·3808315	4·447960	137	11·7046999	5·155137
89	9·4339811	4·464745	138	11·7473444	5·167649
90	9·4868330	4·481405	139	11·7898261	5·180101
91	9·5393920	4·497942	140	11·8321596	5·192494
92	9·5916630	4·514357	141	11·8743421	5·204828
93	9·6436508	4·530655	142	11·9163753	5·217103
94	9·6953597	4·546836	143	11·9582607	5·229321
95	9·7467943	4·562903	144	12·0	5·241482
96	9·7979590	4·578857	145	12·0415946	5·253588
97	9·8488578	4·594701	146	12·0830460	5·265637
98	9·8994949	4·610436	147	12·1243557	5·277632
99	9·9498744	4·626065	148	12·1655251	5·289572
100	10·0	4·641589	149	12·2065556	5.301459
101	10·0498756	4·657010	150	12·2474487	5·313293
102	10 0995049	4·672330	151	12·2882057	5·325074
103	10·1488916	4·687548	152	12·3288280	5·336803
104	10·1980390	4·702669	153	12·3693169	5·348481
105	10·2469508	4·717694	154	12·4096736	5·360108
106	10·2956301	4·732624	155	12·4498996	5·371685
107	10·3440804	4·747459	156	12·4899960	5·383213
108	10·3923048	4·762203	157	12·5299641	5·394690
109	10·4403065	4 776856	158	12·5698051	5·406120
110	10·4880885	4·791420	159	12·6095202	5·417501
111	10·5356538	4·805896	160	12·6491106	5·428835
112	10·5830052	4·820284	161	12·6885775	5·440122
113	10·6301458	4·834588	162	12·7279221	5·451362
114	10·6770783	4·848808	163	12·7671453	5·462556
115	10·7238053	4·862944	164	12·8062485	5·473703
116	10·7703296	4·876999	165	12·8452326	5·484806
117	10·8166538	4·890973	166	12·8840987	5·495865
118	10·8627805	4·904868	167	12·9228480	5·506879
119	10·9087121	4·9186-5	168	12·9614814	5·517848
120	10·9544512	4·932424	169	13·0	5 528775
121	11·0	4·946088	170	13·0384048	5·539658
122	11·0453610	4·959675	171	13·0766968	5·550499
123	11·0905365	4·973190	172	13·1148770	5·561298
124	11·1355287	4·986631	173	13·1529464	5·572054
125	11·1803399	5·0	174	13·1909060	5·582770
126	11·2249722	5·013298	175	13·2287566	5·593445
127	11·2694277	5·026526	176	13·2664992	5·604079
128	11·3137085	5·039684	177	13·3041347	5·614673
129	11·3578167	5·052774	178	13·3416641	5·625226
130	11·4017543	5·065797	179	13·3790882	5·635741
131	11·4455231	5·078753	180	13·4164079	5 646216
132	11·4891253	5·091643	181	13·4536240	5·656652
133	11·5325626	5·104469	182	13·4907376	5·667051
134	11·5758369	5·117230	183	13·5277493	5·677411
135	11·6189500	5·129928	184	13·5646600	5·687734

Number.	Square Root.	Cube Root.	Number.	Square Root.	Cube Root.
185	13·6014705	5·698019	234	15·2970585	6·162239
186	13·6381817	5·708267	235	15·3297097	6·171005
187	13·6747943	5·718479	236	15·3622915	6·179747
188	13·7113092	5·728654	237	15·3948043	6·188463
189	13·7477271	5·738794	238	15·4272486	6·197154
190	13·7840488	5·748897	239	15·4596248	6·205821
191	13·8202750	5·758965	240	15·4919334	6·214464
192	13·8564065	5·768998	241	15·5241747	6·223083
193	13·8924440	5·778996	242	15·5563492	6·231678
194	13·9283883	5·788960	243	15·5884573	6·240251
195	13·9642400	5·798890	244	15·6204994	6·248800
196	14·0	5 808786	245	15·6524758	6·257324
197	14·0356688	5·818648	246	15·6843871	6·265826
198	14·0712473	5·828476	247	15·7162336	6·274304
199	14·1067360	5·838272	248	15·7480157	6·282760
200	14·1421356	5·848035	249	15·7797338	6·291194
201	14·1774469	5·857765	250	15·8113883	6·299604
202	14·2126704	5·867464	251	15·8429795	6·307992
203	14·2478068	5·877130	252	15·8745079	6·316359
204	14·2828569	5·886765	253	15·9059737	6·324704
205	14·3178211	5·896368	254	15·9373775	6·333025
206	14·3527001	5·905941	255	15·9687194	6·341325
207	14·3874946	5·915481	256	16·0	6·349602
208	14·4222051	5·924991	257	16·0312195	6·357859
209	14·4568323	5·934473	258	16·0623784	6·366095
210	14·4913767	5·943911	259	16·0934769	6·374310
211	14·5258390	5·953341	260	16·1245155	6·382504
212	14·5602198	5·962731	261	16·1554944	6·390676
213	14·5945195	5·972091	262	16·1864141	6·398827
214	14·6287388	5·981426	263	16 2172747	6·406958
215	14·6628783	5·990727	264	16·2480768	6·415068
216	14·6969385	6·0	265	16·2788206	6·423157
217	14·7309199	6·009244	266	16·3095064	6 431226
218	14·7648231	6·018463	267	16·3401346	6·439275
219	14·7986486	6·027650	268	16·3707055	6·447305
220	14·8323970	6·036811	269	16·4012195	6·455314
221	14·8660687	6·045943	270	16·4316767	6·463304
222	14·8996644	6·055048	271	16·4620776	6·471274
223	14·9331845	6·064126	272	16·4924225	6·479224
224	14·9666295	6·073177	273	16·5227116	6·487153
225	15·0	6·082201	274	16·5529454	6·495064
226	15·0332964	6·091199	275	16·5831240	6 502956
227	15·0665192	6·100170	276	16·6132477	6·510829
228	15·0996689	6·109115	277	16·6433170	6·518684
229	15·1327460	6·118032	278	16·6733320	6·526519
230	15·1657509	6·126925	279	16·7032931	6·534335
231	15·1986842	6·135792	280	16·7332005	6·542132
232	15·2315462	6·114634	281	16 7630546	6·549911
233	15·2673375	6·153449	282	16·7928556	6 557672

Number.	Square Root.	Cube Root.	Number.	Square Root.	Cube Root.
283	16·8226038	6·565415	332	18·2208672	6·924355
284	16·8522995	6·573139	333	18·2482876	6·931300
285	16·8819430	6·580844	334	18·2756669	6·938232
286	16·9115345	6·588531	335	18·3030052	6·945149
287	16·9410743	6·596202	336	18·3303028	6·952053
288	16·9705627	6·603854	337	18·3575598	6·958943
289	17·0	6·611488	338	18·3847763	6·965819
290	17·0293864	6·619106	339	18·4119526	6·972682
291	17·0587221	6·626705	340	18·4390889	6·979532
292	17·0880075	6·634287	341	18·4661853	6·986369
293	17·1172428	6·641851	342	18·4932420	6·993191
294	17·1464282	6·649399	343	18·5202592	7·0
295	17·1755640	6·656930	344	18·5472370	7·006796
296	17·2046505	6·664443	345	18·5741756	7·013579
297	17·2336879	6·671940	346	18·6010752	7·020349
298	17·2626765	6·679419	347	18·6279360	7·027106
299	17·2916165	6·686882	348	18·6547581	7·033850
300	17·3205081	6·694328	349	18·6815417	7·040581
301	17·3493516	6·701758	350	18·7082869	7·047208
302	17·3781472	6·709172	351	18·7349940	7·054003
303	17·4068952	6·716569	352	18·7616630	7·060696
304	17·4355958	6·723950	353	18·7882942	7·067376
305	17·4642492	6·731316	354	18·8148877	7·074043
306	17·4928557	6·738665	355	18·8414437	7·080698
307	17·5214155	6·745997	356	18·8679623	7·087341
308	17·5499288	6·753313	357	18·8944436	7·093970
309	17·5783958	6·760614	358	18·9208879	7·100588
310	17·6068169	6·767899	359	18·9472953	7·107193
311	17·6351921	6·775168	360	18·9736660	7·113786
312	17·6635217	6·782422	361	19·0	7·120367
313	17·6918060	6·789661	362	19·0262976	7·126935
314	17·7200451	6·796884	363	19·0525589	7·133492
315	17·7482393	6·804091	364	19·0787840	7·140037
316	17·7763888	6·811284	365	19·1049732	7·146569
317	17·8044938	6·818461	366	19·1311265	7·153090
318	17·8325545	6·825624	367	19·1572441	7·159599
319	17·8605711	6·832771	368	19·1833261	7·166095
320	17·8885438	6·839903	369	19·2093727	7·172580
321	17·9164729	6·847021	370	19·2353841	7·179054
322	17·9443584	6·854124	371	19·2613603	7·185516
323	17·9722008	6·861211	372	19·2873015	7·191966
324	18·0	6·868284	373	19·3132079	7·198405
325	18·0277564	6·875343	374	19·3390796	7·204832
326	18·0554701	6·882388	375	19·3649167	7·211247
327	18·0831413	6·889419	376	19·3907194	7·217652
328	18·1107703	6·896435	377	19·4164878	7·224045
329	18·1383571	6·903436	378	19·4422221	7·230427
330	18·1659021	6·910423	379	19·4679223	7·236797
331	18·1934054	6·917396	380	19·4935887	7·243156

Number.	Square Root.	Cube Root.	Number.	Square Root.	Cube Root.
381	19·5192213	7·249504	430	20·7364414	7·547841
382	19·5448203	7·255841	431	20·7605395	7·553688
383	19·5703858	7·262167	432	20·7846097	7·559525
384	19·5959179	7·268482	433	20·8086520	7·565353
385	19·6214169	7·274786	434	20·8326667	7·571173
386	19·6468827	7·281079	435	20·8566536	7·576984
387	19·6723156	7·287362	436	20·8806130	7·582786
388	19·6977156	7·293633	437	20·9045450	7·588579
389	19·7230829	7·299893	438	20·9284495	7·594363
390	19·7484177	7·306143	439	20·9523268	7·600138
391	19·7737199	7·312383	440	20·9761770	7·605905
392	19·7989899	7·318611	441	21·0	7·611662
393	19·8242276	7·324829	442	21·0237960	7·617411
394	19·8494332	7·331037	443	21·0475652	7·623151
395	19·8746069	7·337234	444	21·0713075	7·628883
396	19·8997487	7·343420	445	21·0950231	7·634606
397	19·9248588	7·349596	446	21·1187121	7·640321
398	19·9499373	7·355762	447	21·1423745	7·646027
399	19·9749844	7·361917	448	21·1660105	7·651725
400	20·0	7·368063	449	21·1896201	7·657414
401	20·0249844	7·374198	450	21·2132034	7·663094
402	20·0499377	7·380322	451	21·2367606	7·668766
403	20·0748599	7·386437	452	21·2602916	7·674430
404	20·0997512	7·392542	453	21·2837967	7·680085
405	20·1246118	7·398636	454	21·3072758	7·685732
406	20·1494417	7·404720	455	21·3307290	7·691371
407	20·1742410	7.410794	456	21·3541565	7·697002
408	20·1990099	7·416859	457	21·3775583	7·702624
409	20·2237484	7·422913	458	21·4009346	7·708238
410	20·2484567	7·428958	459	21·4242853	7·713844
411	20·2731349	7·434993	460	21·4476166	7·719442
412	20·2977831	7·441018	461	21·4709106	7·725032
413	20·3224014	7·447033	462	21·4941853	7·730614
414	20·3469899	7·453039	463	21·5174348	7·736187
415	20·3715488	7·459036	464	21·5406592	7·741753
416	20·3960781	7·465022	465	21·5638587	7·747310
417	20·4205779	7·470999	466	21·5870331	7·752860
418	20·4450483	7·476966	467	21·6101828	7·758402
419	20·4694895	7·482924	468	21·6333077	7·763936
420	20·4939015	7·488872	469	21·6564078	7·769462
421	20·5182845	7·494810	470	21·6794834	7·774980
422	20·5426386	7·500740	471	21·7025344	7·780490
423	20·5669638	7·506660	472	21·7255610	7·785992
424	20·5912603	7·512571	473	21·7485632	7·791487
425	20·6155281	7·518473	474	21·7715411	7·796974
426	20·6397674	7·524365	475	21·7944947	7·802453
427	20·6639783	7·530248	476	21·8174242	7·807925
428	20·6881609	7·536121	477	21·8403297	7·813389
429	20·7123152	7·541986	478	21·8632111	7·818849

Number.	Square Root.	Cube Root.	Number.	Square Root.	Cube Root.
479	21·8860686	7·824294	528	22·9782506	8·082480
480	21·9089023	7·829735	529	23·0	8·087579
481	21·9317122	7·835168	530	23·0217289	8·092672
482	21·9544984	7·840594	531	23·0434372	8·097758
483	21·9772610	7·846013	532	23·0651252	8·102838
484	22·0	7·851424	533	23·0867928	8·107912
485	22·0227155	7·856828	534	23·1084400	8·112980
486	22·0454077	7·862224	535	23·1300670	8·118041
487	22·0680765	7·867613	536	23·1516738	8·123096
488	22·0907220	7·872994	537	23·1732605	8·128144
489	22·1133444	7·878368	538	23·1948270	8·133186
490	22·1359436	7·883734	539	23·2163735	8·138223
491	22·1585198	7·889094	540	23·2379001	8·143253
492	22·1810730	7·894446	541	23·2594067	8·148276
493	22·2036033	7·899791	542	23·2808935	8·153293
494	22·2261108	7·905129	543	23·3023604	8·158304
495	22·2485955	7·910460	544	23·3238076	8·163309
496	22·2710575	7·915784	545	23·3452351	8·168308
497	22·2934968	7·921100	546	23·3666429	8·173302
498	22·3159136	7·926408	547	23·3880311	8·178289
499	22·3383079	7·931710	548	23·4093998	8·183269
500	22·3606798	7·937005	549	23·4307490	8·188244
501	22·3830293	7·942293	550	23·4520783	8·193212
502	22·4053565	7·947573	551	23·4733892	8·198175
503	22·4276615	7·952847	552	23·4946802	8·203131
504	22·4499443	7·958114	553	23·5159520	8·208082
505	22·4722051	7·963374	554	23·5372046	8·213027
506	22·4944438	7·968627	555	23·5584380	8·217965
507	22·5166605	7·973873	556	23·5796522	8·222898
508	22·5388553	7·979112	557	23·6008474	8·227825
509	22·5610283	7·984344	558	23·6220236	8·232746
510	22·5831796	7·989569	559	23·6431808	8·237661
511	22·6053091	7·994788	560	23·6643191	8·242570
512	22·6274170	8·0	561	23·6854386	8·247474
513	22·6495033	8·005205	562	23·7065392	8·252371
514	22·6715681	8·010403	563	23·7276210	8·257263
515	22·6936114	8·015595	564	23·7486842	8·262149
516	22·7156334	8·020779	565	23·7697286	8·267029
517	22·7376340	8·025957	566	23·7907545	8·271903
518	22·7596134	8·031129	567	23·8117618	8·276772
519	22·7815715	8·036293	568	23·8327506	8·281635
520	22·8035085	8·041451	569	23·8537209	8·286493
521	22·8254244	8·046603	570	23·8746728	8·291344
522	22·8473193	8·051748	571	23·8956063	8·296190
523	22·8691933	8·056886	672	23·9165215	8·301030
524	22·8910463	8·062018	573	23·9374184	8·305865
525	22·9128785	8·067143	574	23·9582971	8·310694
526	22·9346899	8·072262	575	23·9791576	8·315517
527	22·9564806	8·077374	576	24·0	8·320334

Number.	Square Root.	Cube Root.	Number.	Square Root.	Cube Root.
577	24·0208243	8·325147	626	25·0199920	8·554437
578	24·0416306	8·329954	627	25·0399681	8·558990
579	24·0624188	8·334755	628	25·0599282	8·563537
580	24·0831892	8·339551	629	25·0798724	8·568080
581	24·1039416	8·344341	630	25·0998008	8·572618
582	24·1246762	8·349125	631	25·1197134	8·577152
583	24·1453929	8·353904	632	25·1396102	8·581680
584	24·1660919	8·358678	633	25·1594913	8·586204
585	24·1867732	8·363446	634	25·1793566	8·590723
586	24·2074369	8·368209	635	25·1992063	8·595238
587	24·2280829	8·372966	636	25·2190404	8·599747
588	24·2487113	8·377718	637	25·2388589	8·604252
589	24·2693222	8·382465	638	25·2586619	8·608752
590	24·2899156	8·387206	639	25·2784493	8·613248
591	24·3104916	8·391942	640	25·2982213	8·617738
592	24·3310501	8·396673	641	25·3179778	8·622224
593	24·3515913	8·401398	642	25·3377189	8·626706
594	24·3721152	8·406118	643	25·3574447	8·631183
595	24·3926218	8·410832	644	25·3771551	8·635655
596	24·4131112	8·415541	645	25·3968502	8·640122
597	24·4335834	8·420245	646	25·4165301	8·644585
598	24·4540385	8·424944	647	25·4361947	8·649043
599	24·4744765	8·429638	648	25·4558441	8·653497
600	24·4948974	8·434327	649	25·4754784	8·657946
601	24·5153013	8·439009	650	25·4950076	8·662301
602	24·5356883	8·443687	651	25·5147016	8·666831
603	24·5560583	8·448360	652	25·5342907	8·671266
604	24·5764115	8·453027	653	25·5538647	8·675697
605	24·5967478	8·457689	654	25·5734237	8·680123
606	24·6170673	8·462347	655	25·5929678	8·684545
607	24·6373700	8·466999	656	25·6124969	8·688963
608	24·6576560	8·471547	657	25·6320112	8·693376
609	24·6779254	8·476289	658	25·6515107	8·697784
610	24·6981781	8·480926	659	25·6709953	8·702188
611	24·7184142	8·485557	660	25·6904652	8·706587
612	24·7386338	8·490184	661	25·7099203	8·710982
613	24·7588368	8·494806	662	25·7293607	8·715373
614	24·7790234	8·499423	663	25·7487864	8·719759
615	24·7991935	8·504034	664	25·7681975	8·724141
616	24·8193473	8·508641	665	25·7875939	8·728518
617	24·8394847	8·513243	666	25·8069758	8·732891
618	24·8596058	8·517840	667	25·8263431	8·737260
619	24·8797106	8·522432	668	25·8456960	8·741624
620	24·8997992	8·527018	669	25·8650343	8·745984
621	24·9198716	8·531600	670	25·8343582	8·750340
622	24·9399278	8·536177	671	25·9036677	8·754691
623	24·9599679	8·540749	672	25·9229628	8·759038
624	24·9799920	8·545317	673	25·9422435	8·763380
625	25·0	8·549879	674	25·9615100	8·767719

Number.	Square Root.	Cube Root.	Number.	Square Root.	Cube Root.
675	25·9807621	8·772053	724	26·9072481	8·979376
676	26·0	8·776382	725	26·9258240	8·983508
677	26·0192237	8·780708	726	26·9443872	8·987637
678	26·0384331	8·785029	727	26·9629375	8·991762
679	26·0576284	8·789346	728	26·9814751	8·995883
680	26·0768096	8·793659	729	27·0	9·0
681	26·0959767	8·797967	730	27·0185122	9·004113
682	26·1151297	8·802272	731	27·0370117	9·008222
683	26·1342687	8·806572	732	27·0554985	9·012328
684	26·1533937	8·810868	733	27·0739727	9·016430
685	26·1725047	8·815159	734	27·0924344	9·020529
686	26·1916017	8·819417	735	27·1108884	9·024623
687	26·2106848	8·823730	736	27·1293199	9·028714
688	26·2297541	8·828009	737	27·1477439	9·032802
689	26·2488095	8·832285	738	27·1661544	9·036885
690	26·2678511	8·836556	739	27·1845544	9·040965
691	26·2868789	8·840822	740	27·2029410	9·045041
692	26·3058929	8·845085	741	27·2213152	9·049114
693	26·3248932	8·849344	742	27·2396769	9·053183
694	26·3438797	8·853598	743	27·2580263	9·057248
695	26·3628527	8·857849	744	27·2763634	9·061309
696	26·3818119	8·862095	745	27·2946881	9·065367
697	26·4007576	8·866337	746	27·3130006	9·069422
698	26·4196896	8·870575	747	27·3313007	9·073472
699	26·4386081	8·874809	748	27·3495887	9·077519
700	26·4575131	8·879040	749	27·3678644	9·081563
701	26·4764046	8·883266	750	27·3861279	9·085603
702	26·4952826	8·887488	751	27·4043792	9·089639
703	26·5141472	8·891706	752	27·4226184	9·093672
704	26·5329983	8·895920	753	27·4408455	9·097701
705	26·5518361	8·900130	754	27·4590604	9·101726
706	26·5706605	8·904336	755	27·4772633	9·105748
707	26·5894716	8·908538	756	27·4954542	9·109766
708	26·6082694	8·912736	757	27·5136330	9·113781
709	26·6270539	8·916931	758	27·5317998	9·117793
710	26·6458252	8·921121	759	27·5499546	9·121801
711	26·6645833	8·925307	760	27·5680975	9·125805
712	26·6833281	8·929490	761	27·5862284	9·129806
713	26·7020598	8·933668	762	27·6043475	9·133803
714	26·7207784	8·937843	763	27·6224546	9·137797
715	26·7394839	8·942014	764	27·6405499	9·141788
716	26·7581763	8·946180	765	27·6586334	9·145774
717	26·7768557	8·950343	766	27·6767050	9·149757
718	26·7955220	8·954502	767	27·6947648	9·153737
719	26·8141754	8·958658	768	27·7128129	9·157713
720	26·8328157	8·968809	769	27·7308492	9·161686
721	26·8514432	8·966957	770	27·7488739	9·165656
722	26·8700577	8·971100	771	27·7668868	9·169622
723	26·8886593	8.975240	772	27·7848880	9·173585

Number.	Square Root.	Cube Root.	Number.	Square Root.	Cube Root.
773	27·8028775	9·177544	822	28·6705424	9·367505
774	27·8208555	9·181500	823	28·6879766	9·371302
775	27·8388218	9·185452	824	28·7054002	9·375096
776	27·8567766	9·189401	825	28·7228132	9·378887
777	27·8747197	9·193347	826	28·7402157	9·382675
778	27·8926514	9·197289	827	28·7576077	9·386460
779	27·9105715	9·201228	828	28·7749891	9·390241
780	27·9284801	9·205164	829	28·7923601	9·394020
781	27·9463772	9·209096	830	28·8097206	9·397796
782	27·9642629	9·213025	831	28·8270706	9·401569
783	27·9821372	9·216950	832	28·8444102	9·405338
784	28·0	9·220872	833	28·8617394	9·409105
785	28·0178515	9·224791	834	28·8790582	9·412869
786	28·0356915	9·228706	835	28·8963666	9·416630
787	28·0535203	9·232618	836	28·9136646	9·420387
788	28·0713377	9·237527	837	28·9309523	9·424141
789	28·0891438	9·240433	838	28·9482297	9·427893
790	28·1069386	9·244335	839	28·9654967	9·431642
791	28·1247222	9·248234	840	28·9827535	9·435388
792	28·1424946	9·252130	841	29·0	9·439130
793	28·1602557	9·256022	842	29·0172363	9·442870
794	28·1780056	9·259911	843	29·0344623	9·446607
795	28·1957444	9·263797	844	29·0516781	9·450341
796	28·2134720	9·267679	845	29·0688837	9·454071
797	28·2311884	9·271559	846	29·0860791	9·457799
798	28·2488938	9·275435	847	29·1032644	9·461524
799	28·2665881	9·279308	848	29·1204396	9·465247
800	28·2842712	9·283177	849	29·1376046	9·468966
801	28·3019434	9·287044	850	29·1547595	9·472682
802	28·3196045	9·290907	851	29·1719043	9·476395
803	28·3372546	9·294767	852	29·1890390	9·480106
804	28·3548938	9·298623	853	29·2061637	9·483813
805	28·3725219	9·302477	854	29·2232784	9·487518
806	28·3901391	9·306327	855	29·2403830	9·491219
807	28·4077454	9·310175	856	29·2574777	9·494918
808	28·4253408	9·314019	857	29·2745623	9·498614
809	28·4429253	9·317859	858	29·2916370	9·502307
810	28·4604989	9·321697	859	29·3087018	9·505998
811	28·4780617	9·325532	860	29·3257566	9·509685
812	28·4956137	9·329363	861	29·3428015	9·513369
813	28·5131549	9·333191	862	29·3598365	9·517051
814	28·5306852	9·337016	863	29·3768616	9·520730
815	28·5482048	9·340838	864	29·3938769	9·524406
816	28·5657137	9·344657	865	29·4108823	9·528079
817	28·5832119	9·348473	866	29·4278779	9·531749
818	28·6006993	9·352285	867	29·4448637	9·535417
819	28·6181760	9·356095	868	29·4618397	9·539081
820	28·6356421	9·359901	869	29·4788059	9·542743
821	28·6530976	9·363704	870	29·4957624	9·546402

Number.	Square Root.	Cube Root.	Number.	Square Root.	Cube Root.
871	29·5127091	9·550058	920	30·3315018	9·725888
872	29·5296461	9·553712	921	30·3479818	9·729410
873	29·5465734	9·557363	922	30·3644529	9·732930
874	29·5634910	9·561010	923	30·3809151	9·736448
875	29·5803989	9·564655	924	30·3973683	9·739963
876	29·5972972	9·568297	925	30·4138127	9·743475
877	29·6141858	9·571937	926	30·4302481	9·746985
878	29·6310648	9·575574	927	30·4466747	9·750493
879	29·6479325	9·579208	928	30·4630924	9·753998
880	29·6647939	9·582839	929	30·4795013	9·757500
881	29·6816442	9·586468	930	30·4959014	9·761000
882	29·6984848	9·590093	931	30·5122926	9·764497
883	29·7153159	9·593716	932	30·5286750	9·767992
884	29·7321375	9·597337	933	30·5450487	9·771484
885	29·7489496	9·600954	934	30·5614136	9·774974
886	29·7657521	9·604569	935	30·5777697	9·778461
887	29·7825452	9·608181	936	30·5941171	9·782946
888	29·7993289	9·611791	937	30·6104557	9·785428
889	29·8161030	9·615397	938	30·6267857	9·788908
890	29·8328678	9·619001	939	30·6431069	9·792386
891	29·8496231	9·622603	940	30·6594194	9·795861
892	29·8663690	9·626201	941	30·6757233	9·799333
893	29·8831056	9·692797	942	30·6902185	9·802803
894	29·8998328	9·633390	943	30·7083051	9·806271
895	29·9165506	9·636981	944	30·7245830	9·809736
896	29·9332591	9·640569	945	30·7408523	9·813198
897	29.9499583	9·644154	946	30·7571130	9·816659
898	29·9666481	9·647736	947	30·7733651	9·820117
899	29·9833287	9·651316	948	30·7896086	9·823572
900	30·0	9·654893	949	30·8058436	9·827025
901	30·0166620	9·658468	950	30·8220700	9·830475
902	30·0333148	9·662040	951	30·8382879	9·833023
903	30·0499584	9·665609	952	30·8544972	9·837369
904	30·0665928	9·669176	953	30·8706981	9·840812
905	30·0832179	9·672740	954	30·8868904	9·844253
906	30·0998339	9·676301	955	30·9030743	9·847692
907	30·1164407	9·679860	956	30·9192497	9·851128
908	30·1330383	9·683416	957	30·9354166	9·854561
909	30·1496269	9·686970	958	30·9515751	9·857992
910	30·1662063	9·690521	959	30·9677251	9·861421
911	30·1827765	9·694069	960	31·9838668	9·864848
912	30·1993377	9·697615	961	31·0	9·868272
913	30·2158899	9·701158	962	31·0161248	9·871664
914	30·2324329	9·704698	963	31·0322413	9·875113
915	30·2489669	9·708236	964	31·0483494	9·878530
916	30·2654919	9·711772	965	31·0644491	9·881945
917	30·2820079	9·715305	966	31·0805405	9·885357
918	30·2985148	9·718835	967	31·0966236	9·888767
919	30·3150128	9·722363	968	31·1126984	9·892174

969	31·1287648	9·895580	985	31·3847097	9·949747
970	31·1448230	9·898983	986	31·4006369	9·953113
971	31·1608729	9·902383	987	31·4165561	9·956477
972	31·1769145	9·905781	988	31·4324673	9·959839
973	31·1929479	9·909177	989	31·4483704	9·963198
974	31·2089731	9·912571	990	31·4642654	9·966559
975	31·2249900	9·915962	991	31·4801525	9·969904
976	31·2409987	9·919351	992	31·4960315	9·973262
977	31·2569992	9·922738	993	31·5119025	9·976612
978	31·2729915	9·926122	994	31·5277655	9·979959
979	31·2889757	9·929504	995	31·5436206	9·983304
980	31·3049517	9·932883	996	31·5594677	9·986648
981	31·3209195	9·936261	997	31·5753068	9·989990
982	31·3368792	9·939636	998	31·5911380	9·993328
983	31·3528308	9·943009	999	31·6069613	9·996665
984	31·3687743	9·946379	1000	31·6227767	10·0

To find the cube or square root of a higher number than is contained in the Table.

RULE.—Refer to the Table, and seek in the column of squares or cubes, the number nearest to that number whose root is sought, and the number from which that square or cube is derived, will be the answer required, when decimals are not of importance.

EXAMPLE 1.—Required the square root of 542869.

In the Table of Squares, the nearest number is 543169; and the number from which that square has been obtained is 737.

Therefore, $\sqrt{542869} = 727$ nearly, Ans.

EXAMPLE 2.—Required the cube root of 419684381.

In the table of cubes, the nearest number is 420189749, and the number opposite is 749.

Therefore, $\sqrt[3]{419684381} = 749$ nearly, Ans.

To find more correctly the cube root of a higher number than is contained in the Table.

RULE.—Ascertain by the Table, the nearest cube number to the number given, and call it the assumed cube.

Multiply the assumed cube, and the given number, respectively, by 2; to the product of the assumed cube add the given number, and to the product of the given number add the assumed cube.

Then, by proportion, as the sum of the assumed cube is to the sum of the given number, so is the root of the assumed cube to the root of the given number.

EXAMPLE.—Required the cube root of 412568555.

Per Table, the nearest number is 411830784; and its cube root is 744.

Therefore, $411830784 \times 2 + 412568555 = 1236230123$.

And $412568555 \times 2 + 411830784 = 1236967894$.

Hence as 1236230123 : 1236967894 : : 744 : 744·368, very nearly, Ans.

TABLE X.

AREAS OF CIRCLES.

Dia.	Area.	Dia.	Area.	Dia.	Area.	Dia.	Area.	Dia.	Area.
In.	Inches.	In.	Inches.	Inches	Inches.	Inches	Inches.	Inches	Inches.
1	·785	6	28·274	11	95·033	16	201·06	21	346·36
1/8	·994	1/8	29·464	1/8	97·205	1/8	204·21	1/8	350·49
1/4	1·227	1/4	30·679	1/4	99.402	1/4	207·39	1/4	354·65
3/8	1·484	3/8	31·919	3/8	101·62	3/8	210·59	3/8	358·84
1/2	1.767	1/2	33·183	1/2	103·86	1/2	213·82	1/2	363·05
5/8	2·073	5/8	34·471	5/8	106·13	5/8	217·07	5/8	367·28
3/4	2·405	3/4	35·784	3/4	108·43	3/4	220·35	3/4	371·54
7/8	2·761	7/8	37·122	7/8	110·75	7/8	223·65	7/8	375·82
2	3·141	7	38·484	12	113·09	17	226·98	22	380·13
1/8	3·546	1/8	39·871	1/8	115 46	1/8	230·33	1/8	384·46
1/4	3·976	1/4	41·282	1/4	117·85	1/4	233·70	1/4	388·82
3/8	4·430	3/8	42·718	3/8	120·27	3/8	237·10	3/8	393·20
1/2	4·908	1/2	44·178	1/2	122·71	1/2	240·52	1/2	397·60
5/8	5·411	5/8	45·663	5/8	125·18	5/8	243·97	5/8	402·03
3/4	5·939	3/4	47·173	3/4	127·67	3/4	247·45	3/4	406·49
7/8	6·491	7/8	48·707	7/8	130·19	7/8	250·94	7/8	410·97
3	7·068	8	50·265	13	132·73	18	254·46	23	415·47
1/8	7·669	1/8	51·848	1/8	135·29	1/8	258·01	1/8	420·00
1/4	8·295	1/4	53·456	1/4	137·88	1/4	261·58	1/4	424·55
3/8	8·946	3/8	55·088	3/8	140·50	3/8	265·18	3/8	429·13
1/2	9·621	1/2	56·745	1/2	143·13	1/2	268·80	1/2	433·73
5/8	10·320	5/8	58·426	5/8	145·80	5/8	272·44	5/8	438·36
3/4	11·044	3/4	60·132	3/4	148·48	3/4	276·11	3/4	443·01
7/8	11·793	7/8	61·862	7/8	151·20	7/8	279·81	7/8	447·69
4	12·566	9	63·617	14	153·93	19	283·52	24	452·39
1/8	13·364	1/8	65·396	1/8	156·69	1/8	287·27	1/8	457·11
1/4	14·186	1/4	67·200	1/4	159·48	1/4	291·03	1/4	461·86
3/8	15·033	3/8	69·029	3/8	162·29	3/8	294·83	3/8	466·63
1/2	15·904	1/2	70·882	1/2	165·13	1/2	298·64	1/2	471·43
5/8	16·800	5/8	72·759	5/8	167·98	5/8	302·48	5/8	476 25
3/4	17·720	3/4	74·662	3/4	170·87	3/4	306·35	3/4	481·10
7/8	18·665	7/8	76·588	7/8	173·78	7/8	310·24	7/8	485·97
5	19·635	10	78·540	15	176·71	20	314·16	25	490·87
1/8	20·629	1/8	80·515	1/8	179·67	1/8	318·09	1/8	495·79
1/4	21·647	1/4	82·516	1/4	182·65	1/4	322·06	1/4	500·74
3/8	22·690	3/8	84·540	3/8	185·66	3/8	326·05	3/8	505·71
1/2	23·758	1/2	86·590	1/2	188·69	1/2	330·06	1/2	510·70
5/8	24·850	5/8	88·664	5/8	191·74	5/8	334·10	5/8	515· 2
3/4	25·967	3/4	90·762	3/4	194·82	3/4	338·16	3/4	520·76
7/8	26 108	7/8	92·885	7/8	197·93	7/8	342·25	7/8	525·83

Dia.	Area.	Dia.	Area.	Dia.	Area.	Dia.	Area.	Dia.	Area.
In.	Inches.	In.	Inches.	Inch	Inches	Inch.	Inches.	Inch.	Inches.
26	530·93	32	804·24	38	1134·1	44	1520·5	50	1963·5
1/8	536·04	1/8	810·54	1/8	1141·5	1/8	1529·1	1/8	1973·3
1/4	541·18	1/4	816·86	1/4	1149·0	1/4	1537·8	1/4	1983·1
3/8	546·35	3/8	823·21	3/8	1156·6	3/8	1546·5	3/8	1993·0
1/2	551·54	1/2	829·57	1/2	1164·1	1/2	1555·2	1/2	2002·9
5/8	556·76	5/8	835·97	5/8	1171·7	5/8	1564·0	5/8	2012·8
3/4	562·00	3/4	842·39	3/4	1179·3	3/4	1572·8	3/4	2022·8
7/8	567·26	7/8	848·83	7/8	1186.9	7/8	1581·6	7/8	2032·8
27	572·55	33	855·30	39	1294·5	45	1590·4	51	2042·8
1/8	577·87	1/8	861·79	1/8	1202·2	1/8	1599·2	1/8	2052·8
1/4	583·20	1/4	868·30	1/4	1209·9	1/4	1608·1	1/4	2062·9
3/8	588·57	3/8	874·84	3/8	1217·6	3/8	1617·0	3/8	2072·9
1/2	593·95	1/2	881·41	1/2	1225·4	1/2	1625·9	1/2	2083·0
5/8	599·37	5/8	888·00	5/8	1233·1	5/8	1634·9	5/8	2093·2
3/4	604·80	3/4	894·61	3/4	1240·9	3/4	1643·8	3/4	2103·3
7/8	610·26	7/8	901·25	7/8	1248·7	7/8	1652·8	7/8	2113·5
28	615·75	34	907·92	40	1256 6	46	1661·9	52	2123·7
1/8	621·26	1/8	914·61	1/8	1264·5	1/8	1670·9	1/8	2133·9
1/4	626·79	1/4	921·32	1/4	1272·3	1/4	1680·0	1/4	2144·1
3/8	632·35	3/8	928·06	3/8	1280·3	3/8	1689·1	3/8	2154·4
1/2	6 37·94	1/2	934·82	1/2	1288·2	1/2	1698·2	1/2	2164·7
5/8	643·54	5/8	941·60	5/8	1296·2	5/8	1707·3	5/8	2175·0
3/4	649·18	3/4	948·41	3/4	1304·2	3/4	1716·5	3/4	2185·4
7/8	654·83	7/8	955·25	7/8	1312·2	7/8	1725·7	7/8	2195·7
29	660·52	35	962·11	41	1320·2	47	1734·9	53	2206·1
1/8	666·22	1/8	968·99	1/8	1328·2	1/8	1744·1	1/8	2216·6
1/4	671·95	1/4	975·90	1/4	1336·5	1/4	1753·4	1/4	2227·0
3/8	677·71	3/8	982·84	3/8	1344·4	3/8	1762·7	3/8	2237·5
1/2	683·49	1/2	989·80	1/2	1352 6	1/2	1772·0	1/2	2248·0
5/8	689·29	5/8	996·78	5/8	1360 8	5/8	1781·3	5/8	2258·5
3/4	695·12	3/4	1003·7	3/4	1369·0	3/4	1790·7	3/4	2269 0
7/8	700·98	7/8	1010·8	7/8	1377·2	7/8	1800·1	7/8	2279·6
30	706·86	36	1017·8	42	1385·4	48	1809·5	54	2290·2
1/8	712·76	1/8	1024·9	1/8	1393·7	1/8	1818·9	1/8	2300·8
1/4	718·69	1/4	1032·0	1/4	1401·9	1/4	1828·4	1/4	2311·4
3/8	724·64	3/8	1039·1	3/8	1410·2	3/8	1837·7	3/8	2322·1
1/2	730·61	1/2	1046·3	1/2	1418·6	1/2	1847·4	1/2	2332·8
5/8	736·61	5/8	1053·5	5/8	1426·9	5/8	1856·9	5/8	2343 5
3/4	742·64	3/4	1060·7	3/4	1435·3	3/4	1866·5	3/4	2354·2
7/8	748·69	7/8	1067·9	7/8	1443·7	7/8	1876·1	7/8	2365·0
31	754·76	37	1075·2	43	1452·2	49	1885·7	55	2375·8
1/8	760·86	1/8	1082·4	1/8	1460·6	1/8	1895 3	1/8	2386·6
1/4	766·99	1/4	1089·7	1/4	1469·1	1/4	1905·0	1/4	2397·5
3/8	773·14	3/8	1097·1	3/8	1477·6	3/8	1914·7	3/8	2408·3
1/2	779·31	1/2	1104·4	1/2	1486·1	1/2	1924·4	1/2	2419·2
5/8	785·51	5/8	1111·8	5/8	1494·7	5/8	1934·1	5/8	2430·1
3/4	791·73	3/4	1119·2	3/4	1503·3	3/4	1943·9	3/4	2441·0
7/8	797·97	7/8	1127·6	7/8	1511·9	7/8	1953·6	7/8	2452·0

Dia.	Area.	Dia.	Area.	Dia.	Area.	Dia.	Area.	Dia.	Area.
In.	Inches.	In.	Inches.	Inch.	Inches.	Inch.	Inches.	Inch.	Inches.
56	2463·0	62	3019·0	68	3631·6	74	4300·8	80	5026·5
1/8	2474 0	1/8	3031·2	1/8	3645·0	1/8	4315·3	1/8	5042·2
1/4	2485·0	1/4	3043·4	1/4	3658·4	1/4	4329·9	1/4	5058·0
3/8	2496·1	3/8	3055·7	3/8	3671·8	3/8	4344·5	3/8	5073·7
1/2	2507·1	1/2	3067·9	1/2	3685·2	1/2	4359 1	1/2	5089·5
5/8	2518·2	5/8	3080·2	5/8	3698·7	5/8	4373·8	5/8	5105 4
3/4	2529·4	3/4	3092·5	3/4	3712·2	3/4	4388·4	3/4	5121·2
7/8	2540·5	7/8	3104·8	7/8	3725·7	7/8	4403·1	7/8	5137·1
57	2551·7	63	3117·2	69	3739·2	75	4417·8	81	5153·0
1/8	2562·9	1/8	3129·6	1/8	3752·8	1/8	4432·6	1/8	5168·9
1/4	2574·1	1/4	3142·0	1/4	3766·4	1/4	4447·3	1/4	5184·8
3/8	2585·4	3/8	3154·4	3/8	3780·0	3/8	4462·1	3/8	5200·8
1/2	2596·7	1/2	3166·9	1/2	3793·6	1/2	4476·9	1/2	5216·8
5/8	2608·0	5/8	3179·4	5/8	3807·3	5/8	4491·8	5/8	5232·8
3/4	2619·3	3/4	3191·9	3/4	3821·0	3/4	4506·6	3/4	5248 8
7/8	2630·7	7/8	3204·4	7/8	3834·7	7/8	4521·5	7/8	5264·9
58	2642·0	64	3216·9	70	3848·4	76	4536·4	82	5281·0
1/8	2653·4	1/8	3229·5	1/8	3862·2	1/8	4551·4	1/8	5297·1
1/4	2664·9	1/4	3242·1	1/4	3875·9	1/4	4566·3	1/4	5313·2
3/8	2676·3	3/8	3254·8	3/8	3889·8	3/8	4581·3	3/8	5329 4
1/2	2687·8	1/2	3267·4	1/2	3903·6	1/2	4596·3	1/2	5345 6
5/8	2699·3	5/8	3280·1	5/8	3917·4	5/8	4611·3	5/8	5361·8
3/4	2710·8	3/4	3292·8	3/4	3931 3	3/4	4626·4	3/4	5378·0
7/8	2722·4	7/8	3305·5	7/8	3945·2	7/8	4641·5	7/8	5394·3
59	2733·9	65	3318·3	71	3959·2	77	4656·6	83	5410·6
1/8	2745·5	1/8	3331·0	1/8	3973·1	1/8	4671·7	1/8	5426·9
1/4	2757·1	1/4	3343·8	1/4	3987·1	1/4	4686·9	1/4	5443·2
3/8	2768·8	3/8	3356·7	3/8	4001·1	3/8	4702·1	3/8	5459·6
1/2	2780·5	1/2	3369·5	1/2	4015 1	1/2	4717·3	1/2	5476·0
5/8	2792·2	5/8	3382·4	5/8	4029·2	5/8	4732 5	5/8	5492·4
3/4	2803·9	3/4	3395·3	3/4	4043·2	3/4	4747·7	3/4	5508·8
7/8	2815·6	7/8	3408·2	7/8	4067 3	7/8	4763·0	7/8	5525·3
60	2827·4	66	3421·2	72	4071·5	78	4778·3	84	5541·7
1/8	2839·2	1/8	3434·1	1/8	4085·6	1/8	4793·7	1/8	5558·2
1/4	2851·0	1/4	3447·1	1/4	4099·8	1/4	4809·0	1/4	5574·8
3/8	2862·8	3/8	3460·1	3/8	4114·0	3/8	4824·4	3/8	5591·3
1/2	2874·7	1/2	3473·2	1/2	4128·2	1/2	4838·8	1/2	5607·9
5/8	2886·6	5/8	3486·3	5/8	4142·5	5/8	4855·2	5/8	5624·5
3/4	2898·5	3/4	3499 3	3/4	4156·7	3/4	4870·7	3/4	5641·1
7/8	2910·5	7/8	3512·5	7/8	4171·0	7/8	4886·1	7/8	5657·8
61	2922·4	67	3525·6	73	4185·3	79	4901·6	85	5674·5
1/8	2934·4	1/8	3538·8	1/8	4199·7	1/8	4917·2	1/8	5691·2
1/4	2946·4	1/4	3552·0	1/4	4214·1	1/4	4932·7	1/4	5707·9
3/8	2958·5	3/8	3565·2	3/8	4228 5	3/8	4948·3	3/8	5724·6
1/2	2970·5	1/2	3578·4	1/2	4242·9	1/2	4963·9	1/2	5741·4
5/8	2982·6	5/8	3591·7	5/8	4257·3	5/8	4979·5	5/8	5758·2
3/4	2994·7	3/4	3605·0	3/4	4271·8	3/4	4995·1	3/4	5775·0
7/8	3006·9	7/8	3618·3	7/8	4286·3	7/8	5010·8	7/8	5791·9

Dia.	Area.	Dia.	Area.	Dia.	Area.	Dia.	Area.	Dia.	Area.
Inch.	Inches.	Inch.	Inches.	Inch	Inches.	Inch	Inches.	Inch	Inches.
86	5808·8	89	6221·1	92	6647·6	95	7088·2	98	7542·9
1/8	5825·7	1/8	6238·6	1/8	6665·7	1/8	7106·9	1/8	7562·2
1/4	5842·6	1/4	6256·1	1/4	6683·8	1/4	7125·5	1/4	7581·5
3/8	5859·5	3/8	6273 6	3/8	6701·9	3/8	7144·3	3/8	7600·8
1/2	5876·5	1/2	6291·2	1/2	6720·0	1/2	7163·0	1/2	7620·1
5/8	5893·5	5/8	6308·8	5/8	6738·2	5/8	7181·8	5/8	7639·4
3/4	5910·5	3/4	6326·4	3/4	6756·4	3/4	7200·5	3/4	7658·8
7/8	5927·6	7/8	6344·0	7/8	6776 4	7/8	7219 4	7/8	7678·2
87	5944·6	90	6361·7	93	6792·9	96	7238 2	99	7697·7
1/8	5961·7	1/8	6379·4	1/8	6811·1	1/8	7257·1	1/8	7717·1
1/4	5978·9	1/4	6397·1	1/4	6829·4	1/4	7275·9	1/4	7736·6
3/8	5996·0	3/8	6414·8	3/8	6847·8	3/8	7294·9	3/8	7756·1
1/2	6013·2	1/2	6432·6	1/2	6866·1	1/2	7313·8	1/2	7775·6
5/8	6030·4	5/8	6450·4	5/8	6884·5	5/8	7332·8	5/8	7795·2
3/4	6047·6	3/4	6468·2	3/4	6902·9	3/4	7351·7	3/4	7814·7
7/8	6064·8	7/8	6486·0	7/8	6921·3	7/8	7370·7	7/8	7834·2
88	6082·1	91	6503·8	94	6939·7	97	7389·8	100	7854·0
1/8	6099·4	1/8	6521·7	1/8	6958·2	1/8	7408·8		
1/4	6116·7	1/4	6539·6	1/4	6976·7	1/4	7427·9		
3/8	6134·0	3/8	6557 6	3/8	6995·2	3/8	7447·0		
1/2	6151·4	1/2	6575·5	1/2	7013·8	1/2	7466·2		
5/8	6168·8	5/8	6593·5	5/8	7032·3	5/8	7485·3		
3/4	6186·2	3/4	6611·5	3/4	7050·9	3/4	7504·5		
7/8	6203·6	7/8	6629·5	7/8	7069·5	7/8	7523·7		

USE OF THE TABLE.

To find, by inspection, the area of any circle, from 1 to 100 inches, of which the diameter is given.

TABLE IX.

CIRCUMFERENCES OF CIRCLES.

Dia.	Circum.	Dia.	Circum.	Dia.	Circum.	Dia.	Circum.	Dia.	Circum.
In.	Inches.	In.	Inches.	Inches	Inches.	Inches	Inches.	Inches	Inches.
1	3·141	6	18·84	11	34·55	16	50·26	21	65·97
1/8	3·534	1/8	19·24	1/8	34·95	1/8	50·65	1/8	66·36
1/4	3·927	1/4	19·63	1/4	35·34	1/4	51·05	1/4	66·75
3/8	4·319	3/8	20·02	3/8	35·73	3/8	51·44	3/8	67·15
1/2	4·712	1/2	20·42	1/2	36·12	1/2	51·83	1/2	67·54
5/8	5·105	5/8	20·81	5/8	36·52	5/8	52·22	5/8	67·93
3/4	5·497	3/4	21·20	3/4	36·91	3/4	52·62	3/4	68·32
7/8	5 890	7/8	21·57	7/8	37·30	7/8	53·01	7/8	68 72
2	6·283	7	21·99	12	37·69	17	53·40	22	69·11
1/8	6·675	1/8	22·38	1/8	38·09	1/8	53·79	1/8	69·50
1/4	7·068	1/4	22·77	1/4	38·48	1/4	54·19	1/4	69·90
3/8	7·461	3/8	23·16	3/8	38·87	3/8	54·58	3/8	70·29
1/2	7·854	1/2	23·56	1/2	39·27	1/2	54·97	1/2	70·68
5/8	8·246	5/8	23·95	5/8	39·66	5/8	55·37	5/8	71·07
3/4	8·639	3/4	24·34	3/4	40·05	3/4	55·76	3/4	71·47
7/8	9·032	7/8	24·74	7/8	40·44	7/8	56·15	7/8	71·86
3	9·424	8	25·13	13	40·84	18	56·54	23	72·25
1/8	9·817	1/8	25·52	1/8	41·23	1/8	56·94	1/8	72·64
1/4	10 21	1/4	25·91	1/4	41·62	1/4	57·33	1/4	73·04
3/8	10·60	3/8	26·31	3/8	42·01	3/8	57·72	3/8	73·43
1/2	10·99	1/2	26·70	1/2	42·41	1/2	58·11	1/2	73·82
5/8	11·38	5/8	27·09	5/8	42·80	5/8	58·51	5/8	74·21
3/4	11·78	3/4	27·48	3/4	43·19	3/4	58·90	3/4	74·61
7/8	12·17	7/8	27·88	7/8	43·58	7/8	59·29	7/8	75·00
4	12 56	9	28·27	14	43·98	19	59·69	24	75·39
1/8	12 95	1/8	28·66	1/8	44·37	1/8	60.08	1/8	75·79
1/4	13·35	1/4	29·05	1/4	44·76	1/4	60·47	1/4	76·18
3/8	13·74	3/8	29·45	3/8	45·16	3/8	60·86	3/8	76·57
1/2	14·13	1/2	29·84	1/2	45 55	1/2	61·26	1/2	76·96
5/8	14·52	5/8	30·23	5/8	45·94	5/8	61·65	5/8	77·36
3/4	14·92	3/4	30·63	3/4	46·33	3/4	62·04	3/4	77·75
7/8	15·31	7/8	31·02	7/8	46·73	7/8	62·45	7/8	77·14
5	15·70	10	31·41	15	47·12	20	62·83	25	78·53
1/8	16·10	1/8	31·80	1/8	47·51	1/8	63·22	1/8	78·93
1/4	16·49	1/4	32·20	1/4	47·90	1/4	63·61	1/4	79·32
3/8	16·88	3/8	32·59	3/8	48·30	3/8	64·01	3/8	79·71
1/2	17·27	1/2	32·98	1/2	48·69	1/2	64·40	1/2	80·10
5/8	17·67	5/8	33·37	5/8	49·08	5/8	64·79	5/8	80·50
3/4	18·06	3/4	33·77	3/4	49·48	3/4	65·18	3/4	80·89
7/8	18·45	7/8	34·16	7/8	49·87	7/8	65·58	7/8	81·28

Dia.	Circum.	Dia.	Circum.	Dia.	Circum.	Dia.	Circum.	Dia.	Circum.
In.	Inches	In.	Inches.	Inch.	Inches.	Inch.	Inches.	Inch.	Inches.
26	81·68	32	100·5	38	119·3	44	138·2	50	157·0
1/8	82·07	1/8	100·9	1/8	119·7	1/8	138·6	1/8	157·4
1/4	82·46	1/4	101·3	1/4	120·1	1/4	139·0	1/4	157·8
3/8	82·85	3/8	101·7	3/8	120·5	3/8	139·4	3/8	158·2
1/2	83·25	1/2	102·1	1/2	120·9	1/2	139·8	1/2	158·6
5/8	83·64	5/8	102·4	5/8	121·3	5/8	140·1	5/8	159·0
3/4	84·03	3/4	102·8	3/4	121·7	3/4	140·5	3/4	159·4
7/8	84·43	7/8	103 2	7/8	122·1	7/8	140·9	7/8	159·8
27	84·82	33	103·6	39	122·5	45	141·3	51	160·2
1/8	85·21	1/8	104·0	1/8	122·9	1/8	141·7	1/8	160·6
1/4	85·60	1/4	104·4	1/4	123·3	1/4	142·1	1/4	161·0
3/8	86·00	3/8	104·8	3/8	123·7	3/8	142·5	3/8	161·3
1/2	86·39	1/2	105·2	1/2	124·9	1/2	142·9	1/2	161·7
5/8	86·78	5/8	105·6	5/8	124·4	5/8	143·3	5/8	162·1
3/4	87·17	3/4	106·0	3/4	124·8	3/4	143·7	3/4	162·5
7/8	87·57	7/8	106·4	7/8	125·2	7/8	144·1	7/8	162·9
28	87·96	34	106·8	40	125 6	46	144·5	52	163 3
1/8	88·35	1/8	107 2	1/8	126.0	1/8	144·9	1/8	163·7
1/4	88·75	1/4	107·5	1/4	126·4	1/4	145·2	1/4	164·1
3/8	89·14	3/8	107·9	3/8	126·8	3/8	145·6	3/8	164·5
1/2	89·53	1/2	108·3	1/2	127·2	1/2	146·0	1/2	164·9
5/8	89·92	5/8	108·7	5/8	127·6	5/8	146·4	5/8	165·3
3/4	90·32	3/4	109 1	3/4	128·0	3/4	146·8	3/4	165·7
7/8	90·71	7/8	109·5	7/8	128·4	7/8	147·2	7/8	166·1
29	91·10	35	109 9	41	128·8	47	147·6	53	166·5
1/8	91·49	1/8	110·3	1/8	129·1	1/8	148·0	1/8	166·8
1/4	91·89	1/4	110·7	1/4	129·5	1/4	148·4	1/4	167·2
3/8	92·28	3/8	111·1	3/8	129·9	3/8	148·8	3/8	167·6
1/2	92·67	1/2	111·5	1/2	130·3	1/2	149·2	1/2	168·0
5/8	93·06	5/8	111·9	5/8	130·7	5/8	149·6	5/8	168·4
3/4	93·46	3/4	112·3	3/4	131·1	3/4	150·0	3/4	168·8
7/8	93·85	7/8	112·7	7/8	131·5	7/8	150·4	7/8	169 2
30	94·24	36	113·0	42	131·9	48	150·7	54	169·6
1/8	94·64	1/8	113·4	1/8	132·3	1/8	151·1	1/8	170·0
1/4	95·03	1/4	113·8	1/4	132·7	1/4	151·5	1/4	170·4
3/8	95·42	3/8	114·2	3/8	133·1	3/8	151·9	3/8	170·8
1/2	95·81	1/2	114·6	1/2	133·5	1/2	152·3	1/2	171·2
5/8	96·21	5/8	115·0	5/8	133·9	5/8	152·4	5/8	171·6
3/4	96·60	3/4	115·4	3/4	134·3	3/4	153·1	3/4	172·0
7/8	96·99	7/8	115·8	7/8	134·6	7/8	153·5	7/8	172·3
31	97·38	37	116.2	43	135·0	49	153·9	55	172·7
1/8	97·78	1/8	116·6	1/8	135·4	1/8	154 3	1/8	173·1
1/4	98·17	1/4	117·0	1/4	135·8	1/4	154·7	1/4	173·5
3/8	98·56	3/8	117·4	3/8	136·2	3/8	155·1	3/8	173·9
1/2	98·96	1/2	117·8	1/2	136·6	1/2	155·5	1/2	174·3
5/8	99·35	5/8	118·2	5/8	137·0	5/8	155·9	5/8	174·7
3/4	99·74	3/4	118·5	3/4	137·4	3/4	156·2	3/4	175·1
7/8	100·1	7/8	118·9	7/8	137·8	7/8	156·6	7/8	175·5

Dia.	Circum.	Dia.	Circum.	Dia.	Circum.	Dia.	Circum.	Dia.	Circum.
In.	Inches.	In	Inches.	Inch.	Inches.	Inch.	Inches.	Inch.	Inches.
56	175·9	62	194·7	68	213·6	74	232·4	80	251·3
1/8	176·3	1/8	195 1	1/8	214 0	1/8	232·8	1/8	251·7
1/4	176·7	1/4	195·5	1/4	214.4	1/4	233·2	1/4	252·1
3/8	177·1	3/8	195·9	3/8	214·8	3/8	233·6	3/8	252·5
1/2	177·5	1/2	196·3	1/2	215·1	1/2	234·0	1/2	252·8
5/8	177·8	5/8	196·7	5/8	215·5	5/8	234·4	5/8	25 3·2
3/4	178·2	3/4	197·1	3/4	215·9	3/4	234 8	3/4	253·6
7/8	178·6	7/8	197·5	7/8	216·3	7/8	235·2	7/8	254 0
57	179·0	63	197·9	69	216·7	75	235·6	81	254·4
1/8	179·4	1/8	198·3	1/8	217·1	1/8	236·0	1/8	254·8
1/4	179 8	1/4	198·7	1/4	217·5	1/4	236·4	1/4	255·2
3/8	180·2	3/8	199·0	3/8	217·9	3/8	236·7	3/8	255·6
1/2	180·6	1/2	199·4	1/2	218·3	1/2	237·1	1/2	256·0
5/8	181·0	5/8	199·8	5/8	218·7	5/8	237·5	5/8	226·4
3/4	181·4	3/4	200·2	3/4	219·1	3/4	237·9	3/4	256·8
7/8	181·8	7/8	200·6	7/8	219·5	7/8	238·3	7/8	257·2
58	182·2	64	201·0	70	219·9	76	238·7	82	257·6
1/8	182·6	1/8	201·4	1/8	220·3	1/8	239·1	1/8	258·0
1/4	182·9	1/4	201·8	1/4	220·6	1/4	239·5	1/4	258·3
3/8	183·3	3/8	202·2	3/8	221·0	3/8	239·9	3/8	258·7
1/2	183·7	1/2	202·6	1/2	221·4	1/2	240·3	1/2	259·1
5/8	184·1	5/8	203·0	5/8	221·8	5/8	240·7	5/8	259·5
3/4	184·5	3/4	203·4	3/4	222 2	3/4	241·1	3/4	259·9
7/8	184·8	7/8	203 8	7/8	222·6	7/8	241·5	7/8	260·3
59	185·3	65	204·2	71	223·0	77	242·9	83	260·7
1/8	185·7	1/8	204·5	1/8	223·4	1/8	242·2	1/8	261·1
1/4	186·1	1/4	204·9	1/4	223·8	1/4	242·6	1/4	261·5
3/8	186·5	3/8	205·3	3/8	224·2	3/8	243·0	3/8	261·9
1/2	186·9	1/2	205·7	1/2	224·6	1/2	243·4	1/2	262·3
5/8	187·3	5/8	206·1	5/8	225 0	5/8	243·8	5/8	262·7
3/4	187·7	3/4	206·5	3/4	225·4	3/4	244·2	3/4	263·1
7/8	188·1	7/8	206·9	7/8	225·8	7/8	244·6	7/8	263·5
60	188·4	66	207·3	72	226·1	78	245·0	84	263·8
1/8	188·8	1/8	207·7	1/8	226·5	1/8	245·4	1/8	264·2
1/4	189·2	1/4	208·1	1/4	226·9	1/4	245·8	1/4	264·6
3/8	189·6	3/8	208·5	3/8	227·3	3/8	246·2	3/8	265·0
1/2	190·0	1/2	208·9	1/2	227·7	1/2	246·6	1/2	265·4
5/8	190·4	5/8	209·3	5/8	228·1	5/8	247·0	5/8	265·8
3/4	190·8	3/4	209·7	3/4	228·5	3/4	247·4	3/4	266·2
7/8	191·2	7/8	210·0	7/8	228 9	7/8	247·7	7/8	266·6
61	191·6	67	210·4	74	229·3	79	248·1	85	267·0
1/8	192·0	1/8	210·8	1/8	229·7	1/8	248·5	1/8	267·4
1/4	192·4	1/4	211·2	1/4	230·1	1/4	248·9	1/4	267·8
3/8	192·8	3/8	211·6	3/8	230·5	3/8	249·3	3/8	268·2
1/2	193·2	1/2	2:2·0	1/2	230·9	1/2	249·7	1/2	268·6
5/8	193·6	5/8	212·4	5/8	231·3	5/8	250·1	5/8	268·9
3/4	193·9	3/4	212·8	3/4	231·6	3/4	250·5	3/4	269·3
7/8	194·3	7/8	213·2	7/8	232·0	7/8	250·9	7/8	269·7

Dia.	Circum.	Dia.	Circum.	Dia.	Circum.	Dia.	Circum.	Dia.	Circum.
In.	Inches.	In.	Inches.	Inch.	Inches.	Inch.	Inches.	Inch.	Inches.
86	270·1	89	279·6	92	289·0	95	298·4	98	307·8
1/8	270·5	1/8	279·9	1/8	289·4	1/8	298·8	1/8	308·2
1/4	270·9	1/4	280·3	1/4	289·8	1/4	299·2	1/4	308·6
3/8	271·3	3/8	280·7	3/8	290·2	3/8	299·6	3/8	309·0
1/2	271·7	1/2	281·1	1/2	290·5	1/2	300·0	1/2	309·4
5/8	272·1	5/8	281·5	5/8	290·9	5/8	300·4	5/8	309·8
3/4	272·5	3/4	281·9	3/4	291·3	3/4	300·8	3/4	310·2
7/8	272·9	7/8	282·3	7/8	291·7	7/8	301·2	7/8	310·6
87	273·3	90	282·7	93	292·1	96	301·5	99	311·0
1/8	273·7	1/8	283·1	1/8	292·5	1/8	301·9	1/8	311·4
1/4	274·1	1/4	283·5	1/4	292·9	1/4	302·3	1/4	311·8
3/8	274·4	3/8	283·9	3/8	293·3	3/8	302·7	3/8	312·1
1/2	274·8	1/2	284·3	1/2	293·7	1/2	303·1	1/2	312·5
5/8	275·2	5/8	284·7	5/8	294·1	5/8	303·5	5/8	312·9
3/4	275·6	3/4	285·1	3/4	294·5	3/4	303·9	3/4	313·3
7/8	276·0	7/8	285·4	7/8	294·9	7/8	304 3	7/8	313·7
88	276·4	91	285·8	94	295·3	97	304·7	100	314·1
1/8	276 8	1/8	286·2	1/8	295·7	1/8	305·1		
1/4	277·2	1/4	286·6	1/4	296·0	1/4	305·5		
3/8	277·6	3/8	287·0	3/8	296·4	3/8	305·9		
1/2	278·0	1/2	287·4	1/2	296·8	1/2	306·3		
5/8	278·4	5/8	287·8	5/8	297·2	5/8	306·6		
3/4	278·8	3/4	288·2	3/4	297·6	3/4	307·0		
7/8	279·2	7/8	288·6	7/8	298·0	7/8	307·4		

USE OF TABLE XI.

To find, by inspection, the circumference of any circle, from 1 to 100 inches of which the diameter is given.

TABLE XII.

AREAS OF THE SEGMENTS OF A CIRCLE,

Whose diameter is unity, and supposed to be divided into **1000** *equal parts.*

Hght.	Area Seg.	Hght.	Area Seg.	Hght.	Area Seg.	Hght.	Area Seg.	Hght.	Area Seg.
·001	·000042	·039	·010148	·077	·027821	·115	·050165	153	·076026
·002	·000119	·040	·010537	·078	·028356	·116	·050804	154	·076747
·003	·000219	·041	·010931	·079	·028894	·117	·051446	155	·077469
·004	·000337	·042	·011330	·080	·029435	·118	·052090	156	·078194
·005	·000470	·043	·011734	·081	·029979	·119	·052736	·157	·078921
·006	·000618	·044	·012142	·082	·030526	·120	·053385	·158	·079649
·007	·000779	·045	·012554	·083	·031076	·121	·054036	·159	·080380
·008	·000951	·046	·012971	·084	·031629	·122	·054689	·160	·081112
·009	·001135	·047	·013392	·085	·032186	·123	·055345	·161	·081846
·010	·001329	·048	.013818	·086	·032745	·124	·056003	·162	·082582
·011	·001533	·049	·014247	·087	·033307	·125	·056663	·163	·083320
·012	·001746	·050	·014681	·088	·033872	·126	·057326	·164	·084059
·013	·001968	·051	·015119	·089	·034441	·127	·057991	·165	·084841
·014	·002199	·052	·015561	·090	·035011	·128	·058658	·166	·085544
·015	·002438	·053	·016007	·091	·035585	·129	·059327	·167	·086289
·016	·002685	·054	·016457	·092	·036162	·130	·059999	·168	·087036
·017	·002940	·055	·016911	·093	·036741	·131	·060672	·169	·087785
·018	·003202	·056	017369	·094	·037323	·132	·061348	·170	·088535
·019	·003471	·057	·017931	·095	·037909	·133	·062026	·171	·089287
·020	·003748	·058	·018296	·096	·038496	·134	·062707	·172	·090041
·021	·004031	·059	·018766	·097	·039087	·135	·063389	·173	·090797
·022	·004322	·060	·019239	·098	·039680	·136	·064074	·171	·091554
·023	·004618	·061	·019716	·099	·040276	·137	·064760	·175	·092313
·024	·004921	·062	·020196	·100	·040875	·138	·065449	·176	·093074
·025	·005230	·063	·020680	·101	·041476	·139	·066140	·177	·093836
·026	·005546	·064	·021168	·102	·042080	·140	·066833	·178	·094601
·027	·005867	·065	·021659	·103	·042687	·141	·067528	·179	·095366
·028	·006194	·066	·022154	·104	·043296	·142	·068225	·180	·096434
·029	·006527	·067	·022652	·105	·043908	·143	·068924	·181	·096903
·030	·006865	·068	·023154	·106	·044522	·144	·069625	·182	·097674
·031	·007209	·069	·023659	·107	·045139	·145	·070328	·183	·098447
·032	·007558	.070	·024168	·108	·045759	·146	·071033	·184	·099221
·033	·007913	.071	·024680	·109	·046381	·147	·071741	·185	·099997
·034	·008273	.072	·025195	·110	·047005	·148	·072450	·186	·100774
·035	·008638	.073	·025714	·111	·047632	·149	·073161	·187	·101553
·036	·009008	.073	·026236	·112	·048262	·150	·073874	·188	·102334
·037	·009383	.075	·026761	·113	·048894	·151	·074589	·189	·103446
·038	·009763	.076	·027289	·114	·049528	·152	·075306	·190	·103900

Hght.	Area Seg.	Hght.	Area Seg.	Hght.	Area Seg.	Hght.	Area Seg.	Hght.	Area Seg.
·191	·104685	·240	·144944	·289	·188140	·338	.233580	·387	280668
·192	·105472	·241	·145799	·290	·189047	·339	·234526	·388	·281642
·193	·106261	·242	·146655	·291	·189955	·340	·235473	·389	·282617
·194	·107051	·243	·147512	·292	·190864	·341	·236421	·390	·283592
·195	·107842	·244	·148371	·293	·191775	·342	·237369	·391	·284568
·196	·108636	·245	·149230	·294	·192684	·343	.238318	·392	·285544
·197	·109430	·246	·150091	·295	·193596	·344	·239268	·393	·286521
·198	·110227	·246	·150953	·296	·194509	·345	·140218	·394	·287498
·199	·111024	·248	·151816	·297	·195422	·346	·241169	·395	·288476
·200	·111823	·249	·152680	·298	·196337	·347	·242121	·396	·289453
·201	·112624	·250	·153546	·299	·197252	·348	·243074	·397	·290432
·202	·113426	·251	·154412	·300	·198168	·349	·244026	·398	·291411
·203	·114230	·252	·155280	·301	·199085	·350	·244980	·399	·292390
·204	·115035	·253	·156149	·302	·200003	·351	·245934	·400	·293369
·205	·115842	·254	·157019	·303	·200922	·352	·246889	·401	·294349
·206	·116650	·255	·157890	·304	·201841	·353	·247845	·402	·295330
·207	·117460	·256	·158762	·305	·202761	·354	·248801	·403	·296311
·208	·118271	·257	·159636	·306	·203683	·355	·249757	·404	·297292
·209	·119083	·258	·160510	·307	·204605	·356	·250715	·405	·298273
·210	·119897	·259	·161386	·308	·205527	·357	·251673	·406	·299255
·211	·120712	·260	·162263	·309	·206451	·358	·252631	·407	·300238
·212	·121529	·261	·163140	·310	·207376	·359	·253590	·408	·301220
·213	·122347	·262	·164019	·311	·208301	·360	·254550	·409	·302203
·214	·123167	·263	·164899	·312	·209227	·361	·255510	·410	·303187
·215	·123988	·264	·165780	·313	·210154	·362	·256471	·411	·304171
·216	·124810	·265	·166663	·314	·211082	·363	·257433	·412	·305155
·217	·125634	·266	·167546	·315	·212011	·364	·258395	·413	·306140
·218	·126459	·267	·168430	·316	·212940	·365	·259357	·414	·307125
·219	·127285	·268	·169315	·317	·213871	·366	·260320	·415	·308110
·220	·128113	·269	·170202	·318	·214802	·367	·261284	·416	·309095
·221	·128942	·270	·171089	·319	·215733	·368	·262248	·417	·310081
·222	·129773	·271	·171978	·320	·216666	·369	·263213	·418	·311068
·223	·130605	·272	·172867	·321	·217599	·370	·264178	·419	·312054
·224	·131438	·273	·173758	·322	·218533	·371	·265144	·420	·313041
·225	·132272	·274	·174649	·323	·219468	·372	·266111	·421	·314029
·226	·133108	·275	·175542	·324	·220404	.373	·267078	·422	·315016
·227	·133945	·276	·176735	·325	·221340	·374	·268045	·423	·316004
·228	·134784	·277	·177330	·326	·222277	·375	·269013	·424	·316992
·229	·135624	·278	·178225	·327	·223215	·376	·269982	·425	·317981
·230	·136465	·279	·179122	·328	.224154	·377	·270951	·426	·318970
·231	·137307	·280	·180019	·329	·225093	·378	·271920	·427	·319959
·232	·138150	·281	·180918	·330	·226033	·379	·272890	·428	·320948
·233	·138995	·282	·181817	·331	·226974	·380	·373861	·429	·321938
·234	·139841	·283	·182718	·332	.227915	·381	·274832	·430	·322928
·235	·140688	·284	·183619	·333	·228858	·382	·275803	·431	·323918
·236	·141537	·285	·184521	·334	·229801	·383	·276775	·432	·324909
·237	·142387	·286	·185425	·335	·230745	·384	·277748	·433	·325900
·238	·143238	·287	·186329	·336	.231689	·385	·278721	·434	·326892
·239	·144091	·288	·187234	·337	.232634	·386	279694	·435	·327882

Hght.	Area Seg	Hght.	Area Seg.	Hght.	Area Seg.	Hght.	Area Seg.	Hght.	Area Seg.
·436	·328874	·449	·341787	·462	·354736	·475	·367709	·488	·380700
·437	·329866	·450	·342782	·463	·355732	·476	·368708	·489	·381699
·438	·330858	·451	·343777	·454	·356730	·477	·369707	·490	·382699
·439	·331850	·452	·344772	·465	·357727	·478	·370706	·491	·383699
·440	·332843	·453	·345768	·466	·358725	·479	·371704	·492	·384699
·441	·333836	·454	·346764	·467	·359723	·480	·372704	·493	·385699
·442	·334829	·455	·347759	·468	·360721	·481	·373703	·494	·386699
·443	·335822	·456	·348755	·469	·361719	·482	·374702	·495	·387699
·444	·336816	·457	·349752	·470	·362717	·483	·375702	·496	·388699
·445	·337810	·458	·350748	·471	·363715	·484	·376702	·497	·389699
·446	·338804	·459	·351745	·472	·364713	·485	·377701	·498	·390699
·447	·339798	·460	·352742	·473	·365712	·486	·378701	·499	·391699
·448	·340793	·461	·353739	·474	·366710	·487	·379700	·500	·392699

USE OF THE TABLE.

PROBLEM.

To find the Area of a Segment of a Circle.

RULE.—Divide the height, or versed sine, by the diameter of the circle, and find the quotient in the column of versed sines, or heights.

Then take out the corresponding area, in the next column on the right hand, and multiply it by the square of the diameter; this will give the area of the segment.

EXAMPLE. — Required the area of a segment of a circle, whose height is $3\frac{1}{4}$ feet, and the diameter of the circle 50 feet.

$$3\frac{1}{4} = 3{\cdot}25; \text{ and } 3{\cdot}25 \div 50 = {\cdot}065.$$

·065, as per table, = ·021659; and $·021659 \times 50^2 = 54{\cdot}147500$, the area required.

Approximating Rule to find the Area of a Segment of a Circle.

RULE. — Multiply the chord of the segment by the versed sine, divide the product by 3, and multiply the remainder by 2.

Cube the height, or versed sine, find how often twice the length of the chord is contained in it, and add the quotient to the former product; this will give the area of the segment very nearly.

EXAMPLE. — Required the area of the segment of a circle, the chord being 12, and the versed sine 2.

$$12 \times 2 = 24; \frac{24}{3} = 8; \text{ and } 8 \times 2 = 16,$$

$$2^3 \div 24\ (12 \times 2) = {\cdot}3833.$$

Hence $16 + 3333 = 16{\cdot}3333$, the area of the segment very nearly.

TABLE XIII.

Showing how many Years' Purchase any Annuity or Lease of any Land or House is worth, at the several rates of 4, 5, 6, 7, 8, and 10 per cent Interest, which the purchaser may thereby make of his money.

Term of Years.	4 per cent.	5 per cent.	6 per cent.	7 per cent.	8 per cent.	10 per cent.	Term of Years.
1	1	1	1	1	1	1	1
2	2	1¾	1¾	1¾	1¾	1¾	2
3	2¾	2¾	2¾	2¾	2½	2½	3
4	3¾	3½	3½	3½	3¼	3¼	4
5	4½	4¼	4¼	4	4	3¾	5
6	5¼	5	5	4¾	4¾	4½	6
7	6	5¾	5½	5½	5¼	5	7
8	6¾	6½	6¼	6	5¾	5¼	8
9	7½	7	6¾	6½	6¼	5¾	9
10	8	7¾	7½	7	6¾	6	10
11	8¾	8¼	8	7½	7	6½	11
12	9½	8¾	8½	8	7¼	6¾	12
13	10	9½	8¾	8¼	8	7	13
14	10½	10	9¼	8¾	8¼	7¼	14
15	11	10½	9¾	9	8½	7½	15
16	11¾	10¾	10	9½	8¾	7¾	16
17	12¼	11¼	10½	9¾	9	8	17
18	12¾	11¾	10¾	10	9¼	8¼	18
19	13	12	11¼	10¼	9½	8½	19
20	13½	12¼	11½	10½	9¾	8½	20
21	14	12½	11¾	10¾	10	8¾	21
22	14½	13¼	12	11	10¼	8¾	22
23	14¾	13½	12¼	11¼	10½	9	23
24	15¼	13¾	12½	11½	10½	9	24
25	15½	14	12¾	11¾	10¾	9	25
26	16	14¼	13	11¾	10¾	9¼	26
27	16¼	14½	13¼	12	11	9¼	27
28	16¾	14¾	13½	12	11	9¼	28
29	17	15	13¾	12¼	11¼	9¼	29
30	17¼	15¼	13½	12½	11¼	9½	30
35	18¾	16½	14½	13	11¾	9½	35
40	19¾	17¼	15	13¼	12	9¾	40
45	20¾	17¾	15½	13½	12	9¾	45
50	21½	18¼	15¾	13¾	12¼	10	50
55	22	18¾	16	14	12¼	10	55
60	22½	19	16¼	14	12½	10	60
65	23	19¼	16¼	14	12½	10	65
70	23½	19½	16½	14¼	12½	10	70
75	23¾	19½	16½	14¼	12½	10	75
80	24	19½	16½	14¼	12½	10	80
85	24	19¾	16½	14¼	12½	10	85
90	24¼	19¾	16½	14¼	12½	10	90
95	24½	19¾	16½	14¼	12½	10	95
100	24½	19¾	16½	14¼	12½	10	100
Perpetuity.	25	20	16⅔	14¼	12½	10	Perpetuity.

APPLICATION.

A person wishing to purchase a farm which brings in a yearly rent of $750, on a lease of 55 years, desires to know the present sum that such a farm is worth, allowing him 8 per cent compound interest for his money.

In either of the outside columns, under the term of years, find 55, and opposite thereto, in the column under 8 per cent, we find 12¼, the number of years purchase that such farm is worth; then $750 being multiplied by 12¼ produces $9187,50, the amount required.

REDUCTION OF COINS.

RULES FOR REDUCING FEDERAL MONEY TO OTHER MONEYS.

1. To reduce federal money to New England currency, of 6s to the dollar.

RULE. Multiply the dollars by 3, double the right hand figure of the product for shillings; and the left hand figures will be pound.

2. To reduce federal money to New York currency, of 8s to the dollar.

RULE. Multiply the dollars by 4, double the right hand figure of the product for shillings; and the left hand figures will be pounds.

3. To reduce federal money to New Jersey currency, 7s6d to the dollar.

RULE. Multiply the dollars by 3, divide the product by 8, and the quotient will be pounds.

4. To reduce federal money to Georgia currency, of 4s8d to the dollar.

RULE. Multiply the dollars by 7, divide the product by 30, and the quotient will be pounds.

5. To reduce federal money to Nova Scotia currency, of 5s to the dollar.

RULE. Divide the dollars by 4, and the quotient will be pounds.

6. To reduce federal money to English money, of 4s6d to the dollar.

RULE. Multiply the dollars by 9, divide the product by 40, and the quotion will be pounds.

7. To reduce federal money to Irish money, of 4s10½d to the dollar.

RULE. Multiply the dollars by 117, divide the product by 480, and the quotient will be pounds.

8. To reduce federal money to livres of France, 18½ cents to the livre.

RULE. Reduce the dollars to cents, multiply them by 2, divide by 37, and the quotient will be livres.

9. To reduce federal money to guilders of Holland, 39 cents to the guilder.

RULE. Reduce the dollars to cents, divide them by 39, and the quotient will be guilders.

10. To reduce federal money to marks banco of Hamburgh, 33⅓ cents to the mark.

RULE. Multiply the dollars by 3, and the product will be marks banco.

11. To reduce federal money to rials plate of Spain, 10 cents to the rial.

RULE. Multiply the dollars by 10, and the product will be rials plate.

12. To reduce federal money to milreas of Portugal, 124 cts. to the milrea

RULE. Multiply the dollars by 25, divide the product by 31, and th quotient will be milreas.

13. To reduce federal money to rupees of Bengal, 55½ cents to the rupee.

RULE. Multiply the dollars by 200, divide the product by 101, and the quotient will be rupees.

14. To reduce federal money to pagodas of India, 194 cts to the pagoda.

RULE. Multiply the dollars by 50, divide the product by 97, and the quotient will be pagodas.

15. To reduce federal money to tales of China, 148 cents to the tale.

RULE. Multiply the dollars by 25, divide the product by 37, and the quotient will be tales.

RULES FOR REDUCING OTHER MONEYS TO FEDERAL MONEY.

1. To reduce New England currency of 6s to the dollar, to federal money.

Rule. Annex a cypher, or half the number of shillings (if any) to the pounds; divide the whole by 3, and the quotient will be dollars.

2. To reduce New York currency of 8s to the dollar, to federal money.

Rule. Annex a cypher, or half the number of shillings (if any) to the pounds; divide the whole by 4, and the quotient will be dollars.

3. To reduce New Jersey currency of 7s6d to the dollar, to federal money.

Rule. Multiply the pounds by 8, divide the product by 3, and the quotient will be dollars. If there be any shillings, for every 7s6d add one dollar to the quotient.

4. To reduce Georgia currency of 4s8d to the dollar, to federal money.

Rule. Multiply the pounds by 30, divide the product by 7, and the quotient will be dollars. If there be any shillings, for every 4s8d add one dollar to the quotient.

5. To reduce Nova Scotia currency of 5s to the dollar, to federal money.

Rule. Multiply the pounds by 4, and the product will be dollars. If there be any shillings, for every 5s add one dollar to the product.

6. To reduce English money of 4s6d to the dollar, to federal money.

Rule. Multiply the pounds by 40, divide the product by nine, and the quotient will be dollars. If there be any shillings, for every 4s6d add one dollar to the quotient.

7. To reduce Irish money of 4s10½ to the dollar, federal money.

Rule. Multiply the pounds by 480, divide the product by 117, and the quotient will be dollars. If there be any shillings, for every 4s10½ add one dollar to the quotient.

8. To reduce livres of France, 18½ cents to the livre, to federal money.

Rule. Multiply the livres by 37, divide the product by 200, and the quotient will be dollars.

9. To reduce guilders of Holland, 39 cents to the guilder, to federal money.

Rule. Multiply the guilders by 39, divide the product by 100, and the quotient will be dollars.

10. To reduce marks banco of Hamburgh, 33⅓ cents to the mark, to federal money.

Rule. Divide the marks by 3, and the quotient will be dollars.

11. To reduce rials plate of Spain, 10 cents to the rial, to federal money.

Rule. Divide the rials by 10, and the quotient will be dollars.

12. To reduce milreas of Portugal, 124 cents to the milrea, to federal money.

Rule. Multiply the milreas by 31, divide the product by 25, and the quotient will be dollars.

13. To reduce rupees of Bengal, 55½ cents to the rupee, to federal money.

Rule. Multiply the rupees by 111, divide the product by 200, and the quotient will be dollars.

14. To reduce pagodas of India, 194 cts to the pagoda, to federal money.

Rule. Multiply the pagodas by 97, divide the product by 50, and the quotient will be dollars.

15. To reduce tales of China, 148 cents to the tale, to federal money.

Rule. Multiply the tales by 37, divide the product by 25, and the quotient will be dollars.

MONEY OF ACCOUNT.

MONEY OF ACCOUNT IN ENGLAND.

4 Farthings (qrs) make 1 Penny, d.
12 Pence 1 Shilling, s.
20 Shillings 1 Pound, £.

Note.—Exchanges are negotiated by the ponnd sterling.

A pound is = $4 44⅘ cents.

IN FRANCE.

12 Deniers make 1 Sol.
20 Sols 1 Livre or Frank.

Note.—Exchanges are negotiated by the livre or frank.

A livre or frank is = 18½ cents.

IN HOLLAND.

16 Phennings make 1 Stiver.
20 Stivers 1 Guilder.

Note.—Exchanges are negotiated by the guilder. A guilder is = 39 cts.

IN HAMBURG.

12 Deniers make 1 Sol-lub.
16 Sol-lubs 1 Mark banco.

Note.—Exchanges are negotiated by the mark banco.

A mark is = 33⅓ cents.

IN PORTUGAL.

1000 Reas make 1 Milrea.

Note.—Exchanges are negotiated by the milrea.

A milrea is = $1 24 cents.

IN SPAIN.

34 Marvadives of plate make 1 Rial of plate.
8 Rials of plate make 1 piastre.

Note.—Exchanges are negotiated by the rial and piastre.

A piastre is = 80 cents.
A rial is = 10 cents.

MONEY OF ACCOUNT IN VENICE.

12 Denari make 1 Soldi.
124 Soldi 1 Ducat Banco.

Note.—Exchanges are negotiated by the ducat banco.

A ducat banco is = 93 cents.

IN RUSSIA.

100 Copecs make 1 ruble.

Also,

20 Moscosques make 1 Grive.
10 Grives 1 Ruble.

Note.—Exchanges are negotiated by the ruble. A ruble is = $1.

IN SWEDEN.

32 Orts make 1 Copper Dollar.

Note.—Exchanges are negotiated by the copper dollar.

A copper dollar is = 11⅓ cents.

IN DENMARK AND NORWAY.

16 Schillings make 1 Mark.
6 Marks 1 Rix Dollar.

Note.—Exchanges are negotiated by the rix dollar.

A rix dollar is = $1.

IN TURKEY, EGYPT AND BARBARY.

80 Aspers make 1 Dollar.

Note.—Exchanges are negotiated by the asper and cara grouch of 120 aspers.

A cara grouch is = $1.
An asper is = 8⅓ mills.

IN CHINA.

10 Cash make 1 Canderine.
10 Canderine 1 Mace.
10 Mace 1 Tale.

Note.—Exchanges are negotiated by the tale. A tale is = $1 48.

LAW REGULATING BUILDINGS

IN THE CITY OF BOSTON.

An act to secure the town of Boston from damage by fire.

PASSED FEB. 23, 1818.

SEC. 1. *Be it enacted by the Senate and House of Representatives in General Court assembled and by the authority of the same,* That from and after the passing of this act, no house or building, of any kind whatsoever, which shall be more than ten feet high from the ground to the highest point in the roof thereof, shall be erected or built within the town of Boston, unless all the external sides and ends thereof, shall be built or composed of brick or stone; except so much as may be necessary for doors and windows, and unless the roofs of all such houses or buildings shall be entirely covered with slate, tile or some incombustible composition; and the gutters secured effectually against fire; and no brick or stone wall shall be deemed sufficient, within the meaning of this act, unless the same shall be at least twelve inches thick in the lower story; and eight inches thick above the lower story, and all additions, which shall be made to houses or buildings already erected, and all houses or buildings which shall be erected on old foundations, in part or in whole, shall be deemed and considered within the restrictions and regulations of this act: *Provided, nevertheless,* that upon any wharf, marsh or other place, where no sufficient foundation can be obtained, without unreasonable expense, on permission of the firewards of said town, or the major part of them, in writing, wooden houses or buildings, of not more than two stories high, may be erected, which shall be covered on all sides with slate, tile or lime mortar, and filled in with bricks laid in mortar, and the roofs and gutters shall be secured as before directed.

SEC. 2. *Be it further enacted,* That in all cases where one dwelling house, ware house, store, mill, stable, or other building, above ten feet high, is separated from another dwelling house, or ware house, or store, or mill or stable, or other building, above ten feet high, by a partition, such partition shall be built of stone or brick, and shall be twelve inches thick in the lower story and eight inches thick above the lower story; and shall be built up as far as may be necessary, in order to cover or cap the same with flat stones above the roof; and such wall shall be entirely covered or capped with flat stones, at least two inches in thickness above the roof; and every person offending, against this section, shall forfeit and pay a sum not exceeding one hundred dollars, nor less than fifty dollars.

SEC. 3. *Be it further enacted,* That no wooden building more than ten feet high, shall be removed from any part of the town of Boston to any

other place within the same town, without permission of the firewards of said town, or the major part of them, under such restrictions and provisions as they shall prescribe, nor shall any wooden building heretofore erected within the said town, and not now used as a dwelling house, be hereafter occupied as a dwelling house, or for any other purpose than that to which it is now applied, without the permission of the firewards, as aforesaid.

SEC. 4. *Be it further enacted*, That every person who shall erect or add to, or cause to be erected or added to, any building in said town of Boston, contrary to the true intent and meaning of this act, and every person owning such building so unlawfully erected, and any person who shall remove or alter, or cause to be removed or altered, any building as aforesaid, and every person who shall hereafter use and occupy as and for a dwelling house, any wooden building, heretofore erected within the said town, and not now used or intended for a dwelling house, or shall convert the same to any other purpose than that to which it is now applied, without permission first had and obtained from the firewards of said town, or the major part of them; every person in eitherwise so offending, shall forfeit and pay a fine not less than fifty dollars, nor more than five hundred dollars, according to the nature and aggravation of the offence.

SEC. 5. *Be it further enacted*, That in addition to the fines above mentioned, there shall be laid and assessed upon every house or other building, which shall be erected contrary to the true intent and meaning of this act, the sum of fifty dollars annually, and every year, until such building or addition thereto, shall be effectually secured against fire, and made to conform to the provisions of this act. And it shall be the duty of the Firewards of the said town of Boston to return to the assessors of said town annually, a list of all such houses or other buildings ercted contrary to the provisions of this act, together with attested copies of the record of the conviction of any person or persons for such offence; and thereupon it shall be the duty of the said assessors, to assess upon the owner or owners of the said building or buildings, the sum of fifty dollars, for each and every successive year thereafter, until said house or building shall be made conformable to the provisions of this act, which sum shall be payable by the person or persons by whom said building shall be owned: and shall be collected in the same manner as other taxes are collected: *Provided, nevertheless*, that no such house or building shall be subjected to such annual tax, until an attested copy of said conviction, shall have been duly recorded in the office of the Register of Deeds for the county of Suffolk, whose duty it shall be to receive and record the same.

SEC. 6. *Be it further enacted*, That if any person or persons shall, within the said town of Boston, roast, or cause to be roasted, any cocoa, for the purpose of manufacturing the same into chocolate, in any building whatever, excepting such as may or shall be licensed for that purpose by the major part of the firewards of the town aforesaid, he, she or they, shall forfeit and pay for every such offence, a sum not exceeding five hundred dollars, nor less than two hundred dollars.

SEC. 7 *Be it further enacted*, That all houses or buildings within the said town of Boston, which have been, or shall hereafter be, erected in the manner described in this act, and which are now or which may hereafter be covered, with slate, tile, or other incombustible composition, shall continue to be so covered with slate, tile or other incombustible composition, and shall be kept effectually secured against fire, in manner as is herein before described. And if any person or persons, being owner or proprietor

of any house or other building, or having authority, or whose duty it shall be to repair the same, shall hereafter suffer his, her or their house, or other building, to remain in whole or in part uncovered with slate, tile, or other incombustible composition for the space of thirty days, after he, she, or they, shall have been notified to repair or cover the same by the Firewards of the town of Boston, he, she, or they shall forfeit and pay, for such offence, a sum, not exceeding one hundred dollars, nor less than twenty dollars, and shall be subject to a like fine for every thirty days afterwards, that such house or building shall be by him, her or them suffered to remain so uncovered, in the manner required by this act.

Sec. 8. *Be it further enacted*, That whenever any house or other building within the said town of Boston, hereafter erected, shall be found to have been erected contrary to the provisions of this act, the owner or owners of such house or building, or other person lawfully holden to keep the same in repair, shall be held and required to alter and make such house or building to conform to the provisions of this act. And any person or persons as aforeseid, who shall suffer his, her, or their house, or other building, to be and remain not conformable to the provisions of this act, for the space of thirty days, after he, she or they shall have been notified by the Firewards of the said town thereof, shall forfeit and pay for such offence, a sum not exceeding one hundred dollars, nor less than twenty dollars, and shall be subject to a like fine for every thirty days afterwards, that such house or building shall be by him, her or them suffered to remain out of repair, and exposed to fire as aforesaid, and not conformable to the provisions of this act.

Sec. 9. *Be it further enacted*, That every Tar kettle, which shall be made use of in said town for the purpose of boiling tar, for the use of any ropewalk, and every kettle, boiler, or copper, for the use of any caulker, graver, ship carpenter, tallow chandler, soap boiler, painter or other like artificer, shall be so fixed as to prevent all communication whatsoever between the contents of such kettle, boiler, or copper and the fire. And that the fire-place under every such tar or other kettle, boiler, or copper, shall be constructed with an arch built over the same and secured by an iron door, in such manner as to enclose the fire therein; and every person who shall erect any tar kettle or other kettle, boiler or copper, or use the same for any or either of the purposes aforesaid, contrary to the provisions of this act, shall for every such offence, forfeit and pay a sum not exceeding three hundred dollars, nor less than fifty dollars, according to the degree and aggravation of the same.

Sec. 10. *Be it further enacted*, That every person who shall carry any fire through the streets, lanes, or on any wharves in said town, except in some covered vessel, or who shall kindle a fire in any of the places aforesaid, without permission therefor in writing, of one or more of the firewards of said town, or shall smoke or have in his or her possession, any lighted pipe or segar, in any street, lane or passage way, or on any wharf in said town, shall forfeit and pay for each and every offence, the sum of two dollars, to be recovered of the person so offending, or of his parent, guardian, master or mistress.

Sec. 11. *Be it further enacted*, That if any person shall have in his or her possession, in any rope walk, or in any barn or stable within said town, any fire, lighted pipe or segar, lighted candle, or lamp, except such candle or lamp is kept in a secure lantern, the person so offending shall forfeit and and pay for each offence, a sum not exceeding one hundred dollars nor less than twenty dollars.

SEC. 12. *Be it further enacted*, That all and any of the penalties which are given in and by this act, or in and by a certain act, made and passed the fifteenth day of June, in the year of our Lord one thousand eight hundred and sixteen, entitled "An Act regulating the storage, safe keeping and transportation of Gun powder in the town of Boston," may be recovered by indictment, information or complaint in any court proper to try the same; and in such indictment, information or complaint, it shall not be necessary to set forth any more of said acts, than so much thereof as relates to, and is necessary, truly and substantially to describe the offence alleged to have been committed. And it shall be the duty of each and every fireward in the town of Boston, and they and each of them are hereby reqired to enquire after all offences which shall come to their knowledge, and which shall be committed against the true intent and meaning of this act, and shall cause the same to be duly prosecuted.

SEC. 13. *Be it further enacted*, That it shall be lawful for any one or more of the firewards of said town to require and compel the assistance of all or any of the inhabitants of said town, and any other persons, who shall be present as spectators of any fire; and in any suit or prosecution therefor, it shall be lawful for them to plead the general issue, and give this act in evidence; and if any person shall disobey the lawful and reasonable command of any Fireward or Firewards, to aid in extinguishing such fire, or in rescuing property from destruction thereby, such person, so offending, shall be liable to a fine not exceeding twenty dollars, to be recovered in manner aforesaid.

SEC. 14. *Be it further enacted*, That all acts heretofore passed to secure the town of Boston from damage by fire, be, and the same are hereby repealed, excepting that such parts thereof, as may be necessary to recover all fines and penalties incurred upon the acts aforesaid, shall still remain in full force for that purpose.

SEC. 15. *Be it further enacted*, That all the fines, penalties and assessments, which shall be recovered by force of this act, shall accrue and enure, one half to the use of the poor of the town of Boston, to be paid to the overseers of the poor thereof, and the other half to the Firewards of said town: *Provided, however*, that whenever in the trial of any prosecution under this act, any one or more of the said Firewards shall be sworn and examined as a witness, or as witnesses therein, record thereof shall be made in Court, and the whole fine or penalty in such case, shall enure to the use of the poor of the town of Boston, and be paid to the overseers of the poor thereof as aforesaid.

An act partially to suspend the operation of an act to secure the town of Boston from damage by fire.

PASSED JUNE 16, 1821,

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, That the operation of all laws, now in force, which restrain the erecting and placing of wooden buildings in the town of Boston of more than ten feet in height from the ground to the highest point in the roof thereof, be, and the same are hereby suspended, so far as they respect any house or other building, which may be erected or placed in that part of the town of Boston called South Boston, and which was heretofore set off from the town of Dorchester, for and during the

term of five years from the passing of this act. *Provided however*, that such suspension and exemption, shall not be deemed to extend to any house or building of any kind, to be erected or placed within that part of the town of Boston called South Boston, which shall be more than thirty feet high from the ground to the highest part thereof, or more than forty feet square, or within fifty feet of any other house or other building. And the operation of the laws aforesaid, hereby partially suspended, and all penalties, forfeitures and disabilities thereby imposed, and every clause and provision thereof, shall have the like force and effect, in regard to all houses and other buildings, erected or placed in said South Boston, in any manner not conformable to the conditions and provisions of this act, and in regard to all persons who may be amenable therefor, as if this act had not been passed [*Expired by its own limitation.*]

An act regulating the building with wood within the town of Boston.

PASSED JUNE 16, 1821.

SEC. 1. *Be it enacted by the Senate and House of Representatives in General Court assembled, and by authority of the same,* That from and after the passing of this act, it shall be lawful to build houses, or other buildings of wood within the town of Boston, the posts whereof, measuring from the bottom of the lower sill to the top of the plate, shall not exceed ten feet, and the pitch of the roof thereof, not to exceed one third pitch: *Provided,* that such roof be of a regular slope from the plate to the top thereof, [*and that no window or windows shall be erected or made on the sloping part of the roof of such house and building:* [*Repealed by an act Feb.* 5, 1830.] *And provided, also,* that in no case shall any such house or building exceed sixteen feet in measure from the ground to the highest point in the roof.

SEC. 2. *Be it further enacted,* That so much of the laws heretofore passed, as are inconsistent with the provisions of this act, be and the same are hereby repealed.

An act to provide for the erection of Two Story Wooden Buildings in the City of Boston.

PASSED JUNE 15, 1822.

SEC. 1. *Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same,* That from and after the passing of this act, it shall be lawful to erect, within the city of Boston, two story wooden buildings, to be used for dwelling houses, and for no other purpose, except for such purposes as may be approbated by the Firewards of said city of Boston, of the following description, to wit: the posts to be not more than eighteen feet, the roof to be of a regular pitch of one third; the bottom of the sills to be elevated not exceeding eighteen inches above the level of the street, or above the point where such level shall be determined on by the city authorities; such buildings in no case to be more than thirty feet in height from the bottom of the sill, to the highest point of the roof; and in no case to be more than forty by twenty-five feet on the ground: the roof to be slated, and to have at least one window or scuttle in the same.

SEC. 2. *Be it further enacted*, That whenever two or more buildings as aforesaid shall be joined together, there shall be a partition wall of brick, at least eight inches in thickness, to extend in height at least to an even surface with the under side of the slating of the roof; and whenever any such building shall be erected within five feet of the boundary line of the owner or owners of the land on which it may be built, unless such boundary line be on the highway, it shall have a brick wall of like thickness on the side so joining: *Provided*, that no two story wooden buildings provided for in this act, shall be erected within ten feet of each other, unless one of them have a brick wall on the side next adjoining, of the dimensions aforesaid.

SEC. 3. *Be it further enacted*, That whenever any out buildings shall be connected with the dwelling houses provided for in this act, of more than eleven feet in height, the roof of such out buildings shall be covered with slate.

SEC. 4. *Be it further enacted*, That from and after the passing of this act, no wooden building shall be erected within the city of Boston, except in that part called South Boston, in a range of more than fifty feet in extent, without the intervention of a brick partition wall, of at least eight inches in thickness, such wall to extend six inches at least above the surface of the roof; and no wooden buildings shall be placed within four feet of each other, unless the wall of one of them so adjoining, be of brick or stone, of the thickness aforesaid.

SEC. 5. *Be it further enacted*, That any person who shall be convicted, in due course of law, of violating any of the provisions of this act, either by himself or agent, shall forfeit and pay for each and every such violation, not less than fifty, nor more than five hundred dollars; which penalty he shall pay annually, until such building shall be removed or constructed according to law; one half of said penalty to enure and be paid to the person who shall complain or sue for the same, and the other half to said city of Boston; the same to be recovered in an action of the case, or by indictment.

SEC. 6. *Be it further enacted*, That all laws now in force, so far as they are inconsistent with the provisions of this act, be, and the same are hereby repealed.

An act in addition to "An act regulating the building with wood within the town of Boston."

PASSED FEB. 15, 1830.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, That so much of the act to which this is in addition, and also so much of the ninth section of the act, for the protection of the City of Boston against fire, passed on the tenth day of March, in the year of our Lord one thousand eight hundred and twenty-seven, respectively, as provide that no window or windows shall be erected or made, on the sloping part of the roof of such house or building as is described in the said acts, be and the same are herebv repealed.

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